9/776188

Refine Search

Search Results -

Terms	Documents
L30 and vehicle	27

Database:

US Pre-Grant Publication Full-Text Database
US Patents Full-Text Database
US OCR Full-Text Database
EPO Abstracts Database
JPO Abstracts Database
Derwent World Patents Index
IBM Technical Disclosure Bulletins

Search: L31 and 701/?.ccls.

Refine Search

Recall Text Clear Interrupt

Search History

DATE: Tuesday, March 15, 2005 Printable Copy Create Case

Set Name side by side	**Query**	**Hit Count**	**Set Name** result set
	DB=USPT; THES=ASSIGNEE; PLUR=YES; OP=OR		
L31	L30 and vehicle	27	L31
L30	L29 not l23	43	L30
L29	L14 and wireless$ and (emergenc$ with (condition$ or situation or case))	43	L29
L28	L14 and wireless$ and emergenc$	79	L28
L27	L26 not l24	0	L27
L26	L19 and emergenc$	2	L26
L25	L24 and l22	1	L25
L24	L23 and emergenc$	2	L24
L23	L22 or l19	11	L23
L22	@ad<=20000215 and ((wireless$ with (build$ or made or manufact$) with communicat$) with diagnos$)	2	L22
L21	L20 not l15	11	L21
L20	L19 not l18	11	L20

L19	@ad<=20000215 and ((wireless$ with (build$ or made or manufact$) with communicat$) same diagnos$)	11	L19
L18	L14 and 701/?.ccls.	4	L18
L17	L15 and 701/?.ccls.	0	L17
L16	L15 and diagnos$	2	L16
L15	L14 and (manufacturer with communicat$)	6	L15
L14	(acceler$ with (signal$ or condition$)) and @ad<=20000215 and (wireless$ and (build$ or made or manufact$) and communicat$)	496	L14
L13	L6 and (wireless$ and (build$ or made or manufact$) and communicat$)	1	L13
L12	L9 and (wireless$ and (build$ or made or manufact$) and communicat$)	0	L12
L11	L9 and (wireless$ same (build$ or made or manufact$) same communicat$)	0	L11
L10	L9 and (wireless$ same manufact$ same communicat$)	0	L10
L9	L7 and (vehicle same diagnos$)	18	L9
L8	L7 and wireless$	1	L8
L7	L6 and diagnos$	24	L7
L6	(acceler$ with (signal$ or condition$)) and obd and @ad<=20000215	26	L6
L5	(acceler$ with (signal$ or condition$)) and 701/?.ccls. and obd and @ad<=20000215	0	L5
L4	L3 and accele$	0	L4
L3	5884202.pn. or 6362730.pn. or 6351221.pn.	3	L3
L2	L1 and accelerat$	1	L2
L1	5884202.pn. or 6362720.pn. or 6351221.pn.	3	L1

END OF SEARCH HISTORY

Hit List

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Search Results - Record(s) 11 through 20 of 27 returned.

☐ 11. Document ID: US 6167255 A

L31: Entry 11 of 27 File: USPT Dec 26, 2000

US-PAT-NO: 6167255
DOCUMENT-IDENTIFIER: US 6167255 A

TITLE: System and method for providing menu data using a communication network

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw. De

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☐ 12. Document ID: US 6163281 A

L31: Entry 12 of 27 File: USPT Dec 19, 2000

US-PAT-NO: 6163281
DOCUMENT-IDENTIFIER: US 6163281 A

TITLE: System and method for communication using eye movement

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw. De

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☐ 13. Document ID: US 6161071 A

L31: Entry 13 of 27 File: USPT Dec 12, 2000

US-PAT-NO: 6161071
DOCUMENT-IDENTIFIER: US 6161071 A

TITLE: Method and system for an in-vehicle computing architecture

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw. De

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☐ 14. Document ID: US 6154658 A

L31: Entry 14 of 27 File: USPT Nov 28, 2000

US-PAT-NO: 6154658
DOCUMENT-IDENTIFIER: US 6154658 A

TITLE: Vehicle information and safety control system

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw. D

☐ 15. Document ID: US 6144336 A

L31: Entry 15 of 27 File: USPT Nov 7, 2000

US-PAT-NO: 6144336
DOCUMENT-IDENTIFIER: US 6144336 A
**** See image for Certificate of Correction ****

TITLE: System and method to communicate time stamped, 3-axis geo-position data within telecommunication networks

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw. D

☐ 16. Document ID: US 6083248 A

L31: Entry 16 of 27 File: USPT Jul 4, 2000

US-PAT-NO: 6083248
DOCUMENT-IDENTIFIER: US 6083248 A
**** See image for Certificate of Correction ****

TITLE: World wide patient location and data telemetry system for implantable medical devices

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw. D

☐ 17. Document ID: US 5959529 A

L31: Entry 17 of 27 File: USPT Sep 28, 1999

US-PAT-NO: 5959529
DOCUMENT-IDENTIFIER: US 5959529 A

TITLE: Reprogrammable remote sensor monitoring system

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw. D

☐ 18. Document ID: US 5835008 A

L31: Entry 18 of 27 File: USPT Nov 10, 1998

US-PAT-NO: 5835008
DOCUMENT-IDENTIFIER: US 5835008 A

TITLE: Driver, vehicle and traffic information system

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KWIC	Draw. De

☐ 19. Document ID: US 5777580 A

L31: Entry 19 of 27 File: USPT Jul 7, 1998

US-PAT-NO: 5777580
DOCUMENT-IDENTIFIER: US 5777580 A

TITLE: Vehicle location system

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KWIC	Draw. De

☐ 20. Document ID: US 5719918 A

L31: Entry 20 of 27 File: USPT Feb 17, 1998

US-PAT-NO: 5719918
DOCUMENT-IDENTIFIER: US 5719918 A

TITLE: Short message transaction handling system

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KWIC	Draw. De

Clear | Generate Collection | Print | Fwd Refs | Bkwd Refs | Generate OACS

Terms	Documents
L30 and vehicle	27

Display Format: TI Change Format

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L24: Entry 2 of 2 File: USPT Jun 23, 1992

DOCUMENT-IDENTIFIER: US 5124985 A
**** See image for Certificate of Correction ****
TITLE: Radiocommunication system using time-division digital frames

Application Filing Date (1):
19891206

Detailed Description Text (4):
The digital version of communication equipment and wireless communication would have a great effect on the promotion of the efficiency and facility of work in large office buildings, hospitals, factory sites and another places. For example, in hospitals, diagnostic data could be written into or read from a computer system easily and instantly as well as speech communication. In factories, the transmission of control data to a malfunctioning device situated in a dangerous place, and the reception of monitor data related to the operation of the malfunctioning device could be effected easily and safely. When applied to the integrated service digital network (ISDN), the radiocommunication system of the present invention permits transmission of simple moving images, thus enabling a portable telephone and television conference system to be realized.

Detailed Description Text (43):
FIG. 5 illustrates an example of a specific arrangement of the terminal units T1 and T2 shown in FIG. 3. The terminal unit is arranged to achieve a maximum transmission rate of 144 Kbits/s using any number of channels within the four channels CH0 to CH3. The receiver Rx of the terminal unit includes a high-frequency amplifier 13, a mixer 14, an intermediate-frequency amplifier 15, a frequency synthesizer 16, a demodulator 17, a synchronous detector 18, a decoder 19, a channel selector 20, a transmitting and receiving control information separator 21, a receive data buffer 22, a control information extractor 23, an output interface 24, a band expander 25, a speech analog to digital converter 26, a loudspeaker 27 and a control information output buffer 28. The transmitter Tx of the terminal unit comprises a bandpass filter 31, a power amplifier 32, a frequency synthesizer 33, a modulator 34, a channel selector 35, a synchronization code adding circuit 36, a coder 37, a transmission/reception control information adding circuit 38, a transmit data buffer 39, a control information inserting circuit 40, an input interface 41, a band compressor 42, a speech analog to digital converter 43, a microphone 44 and a control information input buffer 45. The terminal unit further comprises a transmitting and receiving antenna 11, an antenna duplexer 12, a data-flow controlling microcomputer 46, a transmission/reception controlling microcomputer 47, a personal computer 48 and an emergency command switch 49.

Detailed Description Text (57):
As described above, in the terminal unit shown in FIG. 5, digital frames are transmitted on a time division basis using frame count field FC at the time of transmission, and separation of the time-division digital frames is carried out using frame count field FC at the time of reception. Emergency command switch 49 is provided to read, upon actuation, required information, such as destination numbers, previously stored in a ROM of microcomputer 46, and to start sending

operation of the terminal unit instantly.

L31: Entry 2 of 27 File: USPT Jan 13, 2004

US-PAT-NO: 6678612
DOCUMENT-IDENTIFIER: US 6678612 B1

TITLE: Wireless vehicle location and emergency notification system

DATE-ISSUED: January 13, 2004

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Khawam; Maurice A.	Lakewood	CA	90713	

APPL-NO: 09/ 212742 [PALM]
DATE FILED: December 15, 1998

PARENT-CASE:
RELATED APPLICATION This application claims priority from U.S. Provisional Application No. 60/069,730, filed Dec. 16, 1997.

INT-CL: [07] G06 F 19/00, G01 C 21/26

US-CL-ISSUED: 701/213; 701/29, 701/33, 340/426.15, 340/426.19, 340/438, 340/439, 340/825.36, 342/357.07, 342/357.17, 455/456.5, 702/183, 702/188
US-CL-CURRENT: 701/213; 340/426.15, 340/426.19, 340/438, 340/439, 340/825.36, 342/357.07, 342/357.17, 455/456.5, 701/29 , 701/33, 702/183, 702/188

FIELD-OF-SEARCH: 701/213, 701/207, 701/214, 701/216, 701/29, 701/33, 701/31, 701/217, 342/357.07, 342/457, 342/386, 342/46, 342/357.03, 342/357.13, 342/357.17, 340/426, 340/539, 340/531, 340/438-439, 340/989, 340/993, 340/426.1, 340/426.13, 340/426.16, 340/426.15, 340/426.19, 340/825.36, 340/825.49, 702/182-185, 702/188, 455/404, 455/456, 455/456.1, 455/456.5

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

Search Selected Search ALL Clear

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
4258421	March 1981	Juhasz et al.	701/35
5111686	May 1992	Kamiya et al.	73/117.3
5223844	June 1993	Mansell et al.	701/213
5311197	May 1994	Sorden et al.	342/457
5445347	August 1995	Ng	246/169R

☐	5506772	April 1996	Kubozono et al.	701/29
☐	5598167	January 1997	Zijderhand	342/457
☐	5657233	August 1997	Cherrington et al.	705/400
☐	5719771	February 1998	Buck et al.	455/456.5
☐	5808907	September 1998	Shetty et al.	702/188
☐	RE35920	October 1998	Sorden et al.	342/457
☐	5819201	October 1998	DeGraaf	701/208
☐	5825283	October 1998	Camhi	340/438
☐	5835871	November 1998	Smith et al.	701/29
☐	5898391	April 1999	Jefferies et al.	340/988
☐	5933080	August 1999	Nojima	340/539
☐	5945919	August 1999	Trask	340/825.49
☐	5982325	November 1999	Thornton et al.	342/357.07
☐	5983156	November 1999	Andrews	701/115

ART-UNIT: 3661

PRIMARY-EXAMINER: Louis-Jacques; Jacques H.

ATTY-AGENT-FIRM: Patton; Aaron L.

ABSTRACT:

In the event of an accident or another traumatic event to a vehicle, a wireless vehicle location and emergency notification system is provided for determining the location and sensing the condition of a vehicle, comparing this information to established parameters, and transmitting such information to a base station in the event the sensed condition or determined location is outside the established parameters. The base station may then alert local emergency services if necessary. The system utilizes a global positioning receiver for determining the location of the vehicle and sensors for monitoring vehicle conditions such as vehicle attitude, deceleration, shock, temperature and passenger compartment audio. The location and condition information is communicated to a data processor which compares this data to established parameters and recently stored location and condition data. If the location and/or condition information fall outside the established parameters or the new data does not compare with the recently stored data, a transmission is sent to the base station. This information is also communicated to a user interface unit, usually within the passenger compartment, which has a display, keypad, and speaker/microphone. The system operates continuously and without the need for user intervention.

27 Claims, 4 Drawing figures

L31: Entry 2 of 27 File: USPT Jan 13, 2004

DOCUMENT-IDENTIFIER: US 6678612 B1
TITLE: Wireless vehicle location and emergency notification system

Abstract Text (1):
In the event of an accident or another traumatic event to a vehicle, a wireless vehicle location and emergency notification system is provided for determining the location and sensing the condition of a vehicle, comparing this information to established parameters, and transmitting such information to a base station in the event the sensed condition or determined location is outside the established parameters. The base station may then alert local emergency services if necessary. The system utilizes a global positioning receiver for determining the location of the vehicle and sensors for monitoring vehicle conditions such as vehicle attitude, deceleration, shock, temperature and passenger compartment audio. The location and condition information is communicated to a data processor which compares this data to established parameters and recently stored location and condition data. If the location and/or condition information fall outside the established parameters or the new data does not compare with the recently stored data, a transmission is sent to the base station. This information is also communicated to a user interface unit, usually within the passenger compartment, which has a display, keypad, and speaker/microphone. The system operates continuously and without the need for user intervention.

Application Filing Date (1):
19981215

Brief Summary Text (2):
This invention relates to geographic location devices. More particularly, the present invention relates to a wireless location system which tracks the exact geographic location of a vehicle and communicates the vehicle's location by wireless transmission to an external fixed position in the event that a certain condition, such as an accident, occurs involving the vehicle.

Brief Summary Text (3):
It is not uncommon for vehicles, including automobiles and airplanes, to become lost, break down, or even be involved in an accident. The problems associated with such occurrences are exacerbated when in a remote location as there are fewer bypassers and support systems to aid those involved in the emergency.

Brief Summary Text (4):
With the advent of satellites and microelectronics, global positioning systems have been developed which can pinpoint a vehicle's exact location on the earth. Such systems, usually in the form of a hand-held device, are able to obtain their exact location anywhere in the world from a satellite. Although this may help a traveler who is lost, these systems do little for the traveler who is stranded or involved in an accident. Although many travelers carry cellular telephones, oftentimes these telephones have limited ranges. In any event, with the occurrence of an accident, the traveler may be incapacitated to the point of being unable to use his or her phone, even if it is within its calling range.

Brief Summary Text (7):

The present invention resides in a wireless vehicle location and emergency notification system and a related method of operation. The system is capable not only of determining its geographic location using a global position receiver, but also senses and monitors vehicle conditions such as vehicle attitude, shock, deceleration, temperature and audio levels (including speech recognition). When the sensed condition and/or determined location fall outside predetermined established parameters, an information signal is transmitted to a base station indicating that a traumatic event has occurred to the vehicle. The station then notifies emergency services of the exact location and condition of the vehicle without direct intervention on behalf of a user of the vehicle. The system is useful in circumstances such as a vehicle accident, break-down, theft or vandalism, and can detect rapid deceleration, roll-overs, vehicle malfunction and other traumatic events. Moreover, the system of the present invention may be used on all types of vehicles including, automobiles, aircraft, military vehicles and motorcycles.

Brief Summary Text (8):
The wireless vehicle location and emergency notification system generally comprises a data processor control unit, a global positioning receiver, a transmitter, at least one sensor, and a user interface unit. These elements are electronically interconnected through the data processor and may be integrally formed within a housing or independently mounted to the vehicle. An electrical source for the components of the system is typically, provided by a power source of the vehicle in the form of an electrical generator or battery, or an electric source associated with the vehicle and yet independent of any specific power source, such as a back-up system dedicated battery.

Brief Summary Text (9):
Although the system operates continuously, upon starting the vehicle the system performs a self-check initialization procedure which tests for system integrity and determines whether the user is valid or there is a new user. This can be accomplished in a variety of ways, but typically includes the use of the user interface unit. The user interface unit has a keypad into which a password may be entered, and/or a speaker and microphone which can be used for voice recognition. In addition to internal user identification procedures, the system may be notified by an external signal that an invalid user is using the vehicle, whereupon the system is either shut down, the vehicle is shut down or the vehicle tracked.

Brief Summary Text (10):
Geographic location is continuously sensed by the global positioning receiver having an antennae which receives location information from orbiting satellites. The global positioning receiver electronically communicates this information to the data processing control unit. Simultaneously, at least one sensor senses vehicle conditions in a variety of forms including temperature, passenger compartment audio levels, shock, tilt, vehicle attitude and deceleration. This information is also electronically communicated to the data processor unit.

Brief Summary Text (11):
The location and vehicle condition information is compared to predetermined established parameters and previously stored location and vehicle condition information. The received location and sensed condition information is electronically stored. If the received location and/or sensed vehicle conditions are outside the calibrated parameters or significantly different than the previously stored information, a signal containing this information is transmitted to the fixed station. The information is also communicated to the user interface unit, typically mounted in the passenger compartment, which displays the information.

Brief Summary Text (12):
The transmitted signal is received by the base station, which samples the information and, if necessary, notifies local emergency services of the vehicle's

exact location and condition. The base station typically receives this information from a satellite or telephone connection. The base station is also able to send information to the vehicle in order to shut down an invalid user, track the vehicle, or communicate with the occupant of the vehicle.

Drawing Description Text (4):
FIG. 1 is a block diagram for the vehicle components of wireless vehicle location and emergency notification system embodying the present invention;

Drawing Description Text (5):
FIG. 2 is a schematic representation of the base station components of the wireless vehicle location and emergency notification system of the present invention, which base station receives information from the vehicle components of FIG. 1 and coordinates emergency services;

Drawing Description Text (6):
FIG. 3 is a flow chart illustrating initialization steps taken when a vehicle is turned on; and

Detailed Description Text (2):
As shown in the drawings for purposes of illustration, the present invention is concerned with a wireless vehicle location and emergency notification system for identifying and locating a vehicle in the event of an accident or other traumatic event. The system is comprised of two general components: a vehicle mobile transceiver unit (illustrated in FIG. 1) and a fixed monitoring station (illustrated in FIG. 2). Both components rely on wireless satellite communication for determining geographic position and sending location and vehicle condition data, voice communication, and telemetry information. In the event of a traumatic event (such as vehicle break down, an accident or theft) the on-board system senses the traumatic event and notifies the fixed monitoring station of this event, giving information including the condition and exact location of the vehicle. The fixed station can then notify local emergency services.

Detailed Description Text (3):
The mobile transceiver unit, as illustrated in FIG. 1, is typically mounted on a vehicle and includes, generally, a global position sensing receiver module 10 having an antennae 12, a wireless transceiver 14 for transmitting and receiving data having an antennae 16, at least one sensor 18 which determines physical vehicle conditions, a data processing and control unit (generally referred to by the numeral 20, and having subcomponents 22-44), a user interface unit 46, and an electric power source 48-56. The system may be used on all types of vehicles including, automobiles, aircraft, military vehicles and motorcycles.

Detailed Description Text (4):
Referring to the block diagram of FIG. 1, the global position sensing receiver module 10 is a receiver which receives its exact geographic location anywhere in the world from an orbiting satellite. The global position module will operate on DC power, typically from the vehicle, or a back-up battery within the mobile transceiver unit. The global position module 10 may be integrally mounted in the mobile unit with the other components, or separately from the other components. In any event, the global positioning receiver module 10 is mounted on an environmentally suitable location on the vehicle. The global position module's antennae 12 is mounted in a location unshielded by metal enclosure. If the antennae 12 is an active design requiring power, it operates from the same power source as the global positioning module 10. The global positioning module 10 will provide an interface for communication with the processor and control unit 20, communicating the position and other control instructions received by the processor and control unit 20.

Detailed Description Text (5):

The wireless transceiver 14 acts as a data link to a wireless satellite network. The transceiver 14 will operate on DC power, typically from the vehicle or a back-up battery within the mobile transceiver unit. The transceiver 14 may be integrally mounted in the unit housing with the other components of the system, or separately from the other components. In any event, the transceiver 14 is mounted on an environmentally suitable location on the vehicle. The transceiver's antennae 16 is mounted in a location unshielded by metal enclosure. If the antennae 16 is an active design requiring power, it operates from the same power source as the other components of the system. Data signals and control signals communicated to and from the processing and control unit 20 and transceiver 14 may be in digital form specified by the requirements of an interface of the transceiver 14.

Detailed Description Text (6):
The sensors 18 which detect and sense vehicle condition in the form of attitude, shock, tilt, temperature, audio levels within the passenger compartment, and deceleration may be in the form of transducers. The sensors 18 will be mounted within the unit housing or separate from the other components, as in the case of the sensor 18 for passenger compartment audio levels. The sensors 18 will be able to sense tilt, rollover, rapid linear deceleration and other vehicle conditions which are indicative of an accident or other traumatic event.

Detailed Description Text (7):
The data processor and control unit 20 also requires a suitable mounting location in the vehicle and operates on DC power. However, the data processing unit 20 requires an additional connection to the vehicle electrical system indicating whether the vehicle ignition's system is turned on or off. Included in the processor and control unit 20 is circuitry to interface the global positioning receiver module 10, transceiver 14 and sensors 18. The data processor unit 20 may also include circuitry to provide and condition power to the global positioning module 10, sensors 18 and transceiver 14. The circuitry may include battery recharging circuitry.

Detailed Description Text (8):
The data processor and control unit 20 will continuously input data from the global positioning module 10 and sensors 18 and filter unwanted signals and noise while comparing the processed location and vehicle attitude condition information to predetermined calibrated parameters to detect traumatic events. The data processor unit 20, upon detecting a traumatic event, will cause predetermined control actions to be performed, sending information via the transceiver 14 to the fixed station. The data processing unit 20 will also monitor any signals coming in from the transceiver 14 to execute a command to shut down the system or cease transmissions. Such signals would typically be sent from the fixed monitoring station.

Detailed Description Text (9):
As illustrated in FIG. 2, the fixed monitoring station will include a wireless transceiver 58 capable of sending and receiving data and voice signals, a computer workstation 60 having access to a large capacity storage device and database 62 which includes local road and terrain maps as well as emergency service providers, and various phone connections 64 to notify the emergency service providers in the case of an accident or unusual event. The fixed station will have battery back up power 66 and redundant fail safe systems. There may be multiple stations to accommodate call volume or provide local language capabilities.

Detailed Description Text (10):
Referring now to FIG. 3, an initialization task flowchart of the data processor and control unit 20 is given. In such flowchart, the unit is powered on to start 100 the initialization. This may occur when the unit is powered on for the first time, or the vehicle ignition is turned on. Data such as system identification, calibrated parameters, and previously stored data are delivered to the processor and control unit 20 from a flash storage device 200. With this information, the

processor and control unit 20 begins an initializing and self test procedure 300. This involves testing the integrity of the system and opening communication with necessary components and operations.

Detailed Description Text (12):
The system next obtains geographic position data 316 from the global position receiver 10. This data is compared with the last previously stored position data 318. If the positions do not compare (as the vehicle may have been stolen, moved, or the system placed on another vehicle) the system tests for new service 320. If it is determined that there is not a new user, an error message is transmitted 312. If the user is found to be new, then the initialization task proceeds to the main program 322, as illustrated in FIG. 4. If the new position data compares with the last recorded position data, the system next checks the message data 324 and tests for the validity of the user 326. If the user is found to be invalid, due to theft or non-payment of service dues, the unit and system is shut down 328. If the user is valid, the system proceeds to the main program 322.

Detailed Description Text (13):
Although the process of a self-check initialization procedure when the vehicle is powered has been described above, it is not necessary to turn on the vehicle in order for the system to work. The system has back-up power and continuously runs through the main program 322 which will be described below. Therefore, in the event of a hit and run or some other form of vandalism, the system would still detect the traumatic event and transmit this information to the base station.

Detailed Description Text (14):
The system also runs continuously, allowing the base station to track the vehicle as it is traveling. Although this may have many applications, a contemplated application is for aircraft which under current circumstances are not able to be tracked over certain "dead spots", such as certain areas of the North Atlantic Ocean. Using the present invention, the aircraft would be trackable at any spot on the earth as it utilizes the global positioning receiver 10 and orbiting satellites to pinpoint the vehicles location instead of conventional radar and other systems which have areas in which they are unable to track vehicles. Continuous tracking would also be possible even when the vehicle is not powered due to the back-up power 48 within the system.

Detailed Description Text (15):
Referring specifically now to FIG. 4, once the data processor and control system is initialized 300, the system begins the main program 322 by entering the main loop 400. The data processor unit 20 obtains global positioning data 410 and compares this data with the last recorded and stored position data 420. If the positions are significantly different, there is a failure and an error transmission 430 is sent. If the positions are similar, the unit next obtains the sensor data 440 and compares the new data with the last stored sensor data 450. If the sensor data comparison is different, there is a failure and an error transmission 460 is sent. However, if the sensor data are similar, the system obtains message data 470, in the form of system specific passwords and codes and tests them 480. If there are passwords and codes, a user message transmission 490 is sent. If not, this information is processed 500 and a message is sent 510 in order that the system be updated 520 to include the specifications and password. The system continuously performs steps 400 through 520 in order to determine whether there has been a traumatic event to the vehicle, which event would be reflected in the sensed attitude or physical condition of the vehicle or geographic position of the vehicle.

Detailed Description Text (16):
For example, if the vehicle were to crash into another object, sensors 18 would register shock and deceleration changes which would activate a transmission to the fixed monitoring station without the need for the occupant's participation. If the

alarm were a false alarm, the occupant could cancel the alarm through the user interface unit 46. If the alarm were a true alarm, the fixed station could then open a voice communication link with the occupant, check for other sensed conditions such as temperature and notify the local emergency service of the condition and location of the vehicle.

Detailed Description Text (17):
The system may contain personal information on the occupant or vehicle such as the occupants home telephone number, or vehicle description. This information can be used to aid in the location and identification of the vehicle and its occupant.

Detailed Description Text (18):
The system also aids the user of the system to track his or her vehicle when it has been stolen or vandalized. The sensors 18 may be capable of detecting a broken window, or a car started without a key. The system may use a password entered into the user interface 46 or the user interface be suited for voice recognition to identify a valid user. As the transceiver 14 is able to both transmit as well as receive, the fixed monitoring station could track the location of the vehicle if it detected as being stolen.

Detailed Description Text (19):
Although the description set forth above describes in detail the invention, for purposes of illustration, various modifications may be made without departing from the spirit and scope of the invention. Accordingly, the invention is not to be limited, except as by the appended claims.

CLAIMS:

1. A device for interactively monitoring and taking action based on sensed conditions of vehicles, the device comprising: a data processor; communication means in electrical connection with said data processor for automatic communication with the base station, wherein said communication means includes a wireless link that comprises a satellite based transceiver or a land based transceiver, or both a satellite based transceiver and a land based transceiver; a power supply which is independent of the vehicle's electrical system, is always activated and is in electrical connection with said data processor; a vehicle transceiver, connected to said power supply and said data processor, for sending transmissions from persons in a vehicle, or for sending and receiving electrical signals to and from the vehicle and to and from the base station, respectively; and an input system connected to a data processor which includes: a global position receiver in electronic communication with one or more global position satellites and with said data processor, for determining vehicle location and generating position signals; at least one sensor located in or on the vehicle in electrical connection with the data processor, said at least one sensor comprising a temperature sensor, a pressure sensor, a shock sensor, an attitude sensor, a direction sensor, a wheel position sensor, a wheel revolution sensor, an acceleration and deceleration sensor, or an altitude sensor, or any combination of said sensors, each sensor producing an electrical sensor signal indicating its respective sensed condition of the vehicle; at least one user interface unit comprising a microphone for receiving a user's voice and generating one or more voice signals representing the user's voice; analog-to-digital conversion means in electrical communication with the data processor for receiving said sensor signals and said voice signals and converting them to digital sensor data; self-testing means, including voice recognition means in electrical connection with said data processor for identifying one or more authorized users' voices, and providing a user approved signal indicating that the user's voice is recognized and whether the user is authorized or unauthorized; wherein said data processor is configured and programmed to respond to said position signals, digital sensor data, said user approved signal and said voice signal to generate output signals indicating information about the condition of the vehicle or the nature of an emergency, or both the condition of the vehicle and the

nature of an emergency, based on the sensed data, wherein said data processor continuously compares a present signal of each of said sensors with a previously received signal and with predetermined calibrated parameters that are stored in look up tables in computer memory, to generate a response based on the comparison and on the information stored in said look up tables, which response notifies the driver and/or sends the response by said vehicle transceiver to the base station or to at least one emergency response service provider, or to both the base station and the at least one emergency response service provider, indicating the vehicle's condition thereby anticipating a problem before it occurs or taking action to correct a problem automatically.

2. A vehicle mobile unit for providing location and emergency notification information to a user or a base station and taking action based on such information, the mobile unit comprising: a data processor; input-output components, wherein each input-output component is located within or on the outside of a vehicle and is connected physically or wirelessly to said data processor, the input-output components comprising a mobile unit transceiver, wherein said transceiver is capable of receiving transmit signals from the data processor and sending mobile unit transmissions based on said transmit signals, via wireless communication means, to a base station and receiving base station transmissions, and of generating transceiver signals for use by the data processor based on the base station transmissions; a global position receiver that is able to receive navigation signals from at least one global position satellite, determine the vehicle's geographic location, and generate vehicle location signals indicating said geographic location; at least one vehicle condition sensor, wherein each of the vehicle condition sensors is able to sense one or more vehicle conditions and to generate at least one vehicle sensor signal indicating information about at least one of the vehicle conditions; at least one user input sensor, wherein each of the user input sensors is able to sense at least one user input and to generate one or more user input signals indicating information about at least one of the user inputs, wherein at least one of the user input sensors comprises a sound detecting device that is able to sense user input in the form of the user's voice and to generate at least one voice signal representing the user's voice; and, one or more user notification devices whereby the data processor is able to communicate information to the user, wherein at least one of the user notification devices comprises a visual display device or a sound generating device, or both a visual display device and a sound generating device; an independent electric power supply, wherein said independent power supply is adapted to assure that electric power is available for operation of the data processor, the transceiver, and at least one of the input-output components, when vehicle electrical system power is not available for such operation; computer memory, comprised of one or more computer memory devices, wherein the computer memory is able to store mobile unit data, said mobile unit data comprising vehicle location information, vehicle sensor information, user input information, including voice recognition information suitable for identifying one or more authorized users' voices, and one or more predetermined calibrated parameters, and wherein said mobile unit data is accessible by the data processor; wherein said data processor is configured and programmed to read one or more input signals received by the data processor and automatically generate one or more output signals in response to at least one of the input signals, which input signals each comprise at least one of the vehicle location signals, at least one of the vehicle sensor signals, or at least one of the user input signals, or any combination thereof; wherein the data processor is further configured and programmed to recognize one or more authorized users based upon at least one authorized voice signal, which authorized voice signal comprises at least one of the voice signals representing the voice of the particular authorized user, to generate at least one user-vocalized signal when the at least one authorized voice signal indicates the particular authorized user is making one or more pre-selected user vocalizations, and to send the at least one of the user-vocalized signals via at least one of said communication means to the base station, whereby the base station is advised of a message that has been associated with the one or more pre-

selected user vocalizations; wherein the data processor is further configured and programmed to continuously, while operating, perform a main program loop, wherein the data processor in each cycle through the loop makes a main-loop comparison between at least one input signal and at least one of the predetermined calibrated parameters; wherein the input signals further comprise the additional alternative of at least one main-loop comparison signal, which main-loop comparison signal indicates the result of one or more of the main-loop comparisons; wherein the output signals comprise one or more emergency response signals when at least one of the main-loop comparisons indicates, based on predetermined criteria, that an undesirable event is impending; and, wherein one or more of the emergency response signals comprise notification to the user or the base station, or to both the user and the base station, about the status of the vehicle or the user, or the vehicle and the user, vis-a-vis the event.

3. The mobile unit of claim 2, wherein at least one of said communication means includes an Internet link and the data processor is further configured and programmed to communicate via the Internet link.

4. The mobile unit of claim 2, wherein said one or more output signals comprise automatically contacting at least one emergency service provider via at least one of said communication means.

5. The mobile unit of claim 2, wherein said communication means includes at least one satellite.

6. The mobile unit of claim 2, wherein the data processor is configured and programmed to receive at least one predefined command signal from the base station or the user, or both the base station and the user, and to generate a control signal based upon the at least one command signal and communicate the control signal to at least one controllable part of the vehicle, wherein the controllable part is controlled in some respect by the control signal.

7. The mobile unit of claim 2, wherein the data processor is further configured and programmed to generate at least one internal control signal based upon the results of one or more of the main-loop comparisons and communicate the at least one internal control signal to at least one controllable part of the vehicle, wherein the controllable part is controlled in some respect by the internal control signal.

8. The mobile unit of claim 2, wherein the one or more vehicle condition sensors comprise at least one temperature sensor, at least one pressure sensor, at least one shock sensor, at least one attitude sensor, at least one direction sensor, at least one wheel position sensor, at least one wheel revolution sensor, at least one acceleration sensor, or at least one altitude sensor, or any combination of such vehicle condition sensors.

10. The mobile unit of claim 2, wherein the data processor is configured and programmed to determine dynamic as well as static characteristics of at least one of the vehicle conditions.

12. The mobile unit of claim 2, wherein at least one of the computer memory devices stores initializing information, wherein the initializing information includes at least part of the voice recognition information sufficient to identify one or more of the authorized users' voices, and wherein the initializing information is accessible to the data processor; wherein the data processor is further configured and programmed to detect whether vehicle electric power is on or off and to perform an initialization procedure upon detecting that the vehicle electric power has changed from off to on, and wherein said initialization procedure includes one or more initialization comparisons and generation of one or more initialization messages; wherein at least one of the initialization comparisons comprises a user

validity test in which a voice comparison is made between information indicated by the voice signal and the at least part of the voice recognition information, and wherein at least one of the initialization messages includes a user invalidity signal indicating the user is not authorized when the voice comparison resulted in the user's voice not being recognized as the voice of one of the authorized users.

13. The mobile unit of claim 12, wherein the initializing information includes stored self test information, wherein at least one of the initialization comparisons comprises a self test in which a self test comparison is made between initializing self test information and at least part of the stored self test information, and wherein at least one of the initialization messages includes a self test signal indicating a self test error when the self test comparison was not within predetermined self test specifications.

14. The mobile unit of claim 12, wherein the initializing information includes stored sensor information, wherein the one or more initialization comparisons comprises a sensor test in which a sensor data comparison is made between initializing sensor information and at least part of the stored sensor information, and wherein at least one of the initialization messages includes a sensor test signal indicating a sensor data error when the sensor data comparison is not within predetermined sensor test specifications.

15. The mobile unit of claim 12, wherein the initializing information includes stored location information, wherein the at least one initialization comparison comprises a location test in which a location data comparison is made between initializing location information and at least part of the stored location information, and wherein the at least one initialization message includes a location test signal that causes a new service user test to be conducted when the location data comparison is not within predetermined specifications.

16. The mobile unit of claim 12, wherein the data processor is configured and programmed to generate one or more initializing control signals based upon one or more initialization comparisons, including the voice comparison, and communicate the initializing control signal to at least one controllable part of the vehicle, wherein the controllable part is adapted to be controlled in some respect based upon the initializing control signal.

17. A wireless vehicle location and emergency notification system comprising: a mobile unit and a base station, wherein the mobile unit and the base station are linked to one another by one or more interactive wireless communication means; wherein the mobile unit comprises a data processor; input-output components, wherein each input-output component is located within or on the outside of a vehicle and is connected physically or wirelessly to said data processor, the input-output components comprising a transceiver, a global position receiver, at least one vehicle condition sensor, at least one user input sensor, and at least one user notification device; wherein said transceiver is capable of receiving transmit signals from the data processor and sending mobile unit transmissions based on said transmit signals, via wireless communication means, to the base station and receiving base station transmissions, and of generating transceiver signals for use by the data processor based on the base station transmissions; wherein the global position receiver is able to receive navigation signals from at least one global position satellite, to determine the vehicle's geographic location, and to generate vehicle location signals indicating said geographic location; wherein each of the vehicle condition sensors is able to sense one or more vehicle conditions and to generate at least one vehicle sensor signal indicating information about at least one of the vehicle conditions; wherein each of the user input sensors is able to sense at least one user input caused by a vehicle user and to generate one or more user input signals indicating information about at least one of the user inputs, wherein at least one of the user input sensors comprises a sound detecting device that is able to sense user input in the

form of the user's voice and to generate at least one voice signal representing the user's voice; and, wherein each of the user notification devices provides a means whereby the data processor is able to communicate information to the user, wherein at least one of the user notification devices comprises a visual display device or a sound generating device, or both a visual display device and a sound generating device; an independent electric power supply, wherein said independent power supply is adapted to assure that electric power is available for operation of the data processor, the transceiver, and at least one of the input-output components, when vehicle electrical system power is not available for such operation; computer memory, said computer memory comprising one or more computer memory devices, wherein said computer memory is able to store mobile unit data, said mobile unit data comprising vehicle location information, vehicle sensor information, user input information, including voice recognition information suitable for identifying one or more authorized users' voices, and one or more predetermined calibrated parameters, and wherein said mobile unit data is accessible by the data processor; wherein said data processor is configured and programmed to read one or more input signals received by the data processor and automatically generate one or more output signals in response to at least one of the input signals, which input signals each comprise at least one of the vehicle location signals, at least one of the vehicle sensor signals, or at least one of the user input signals, or any combination thereof; wherein the data processor is further configured and programmed to recognize one or more authorized users based upon at least one authorized voice signal, which authorized voice signal comprises at least one of the voice signals representing the voice of the particular authorized user, to generate at least one user-vocalized signal when the at least one authorized voice signal indicates the particular authorized user is making one or more pre-selected user vocalizations, and to send the at least one of the user-vocalized signals via at least one of said communication means to the base station, whereby the base station is advised of a message that has been associated with the one or more pre-selected user vocalizations; wherein the data processor is further configured and programmed to continuously, while operating, perform a main program loop, wherein the data processor in each cycle through the loop makes a main-loop comparison between at least one input signal and at least one of the predetermined calibrated parameters; wherein the input signals further comprise the additional alternative of at least one main-loop comparison signal, which main-loop comparison signal indicates the result of one or more of the main-loop comparisons; wherein the output signals comprise one or more emergency response signals when at least one of the main-loop comparisons indicates, based on predetermined criteria, that an undesirable event is impending; and, wherein one or more of the emergency response signals comprise notification to the user or the base station, or to both the user and the base station, about the status of the vehicle or the user, or the vehicle and the user, vis-a-vis the event, wherein the base station comprises a computer work station; a base station transceiver in electronic communication with the computer work station and adapted to send information to and receive information from at least one of the mobile units via at least one of the communication means; a means for maintaining a supply of electric power to the base station even when no power is available to the base station from an external power line, whereby the base station is able to remain in operation on a substantially continuous basis; means for a base station operator to receive information transmitted from the data processor and to transmit information to the data processor; a computer storage means for storing base station computer data, wherein the computer work station is configured and programmed for accessing selected portions of said computer data and transmitting information to the data processor based upon the selected portions, on a substantially real time basis; means for communicating with at least one emergency service provider; and, means for communicating with the user.

18. The system of claim 17, wherein at least one of the computer memory devices stores initializing information, wherein the initializing information includes at least part of the voice recognition information sufficient to identify one or more of the authorized users' voices, whereby the initializing information is accessible

to the data processor; wherein the data processor is further configured and programmed to detect whether vehicle electric power is on or off and to perform an initialization procedure upon detecting that the vehicle electric power has changed from off to on, and wherein said initialization procedure includes one or more initialization comparisons and generation of one or more initialization messages; wherein at least one of the initialization comparisons comprises a user validity test in which a voice comparison is made between information indicated by the voice signal and the at least part of the voice recognition information, and wherein at least one of the initialization messages includes a user invalidity signal indicating that the user is not authorized when the voice comparison resulted in the user's voice not being recognized as the voice of one of the authorized users.

19. The system of claim 17, wherein the initializing information includes stored self test information, wherein at least one of the initialization comparisons comprises a self test in which a self test comparison is made between initializing self test information and at least part of the stored self test information, and wherein at least one of the initialization messages includes a self test signal indicating a self test error when the self test comparison was not within predetermined self test specifications.

20. The system of claim 17, wherein the initializing information includes stored sensor information, wherein the one or more initialization comparisons comprises a sensor test in which a sensor data comparison is made between initializing sensor information and at least part of the stored sensor information, and wherein at least one of the initialization messages includes a sensor test signal indicating a sensor data error when the sensor data comparison is not within predetermined sensor test specifications.

21. The system of claim 17, wherein the initializing information includes stored location information, wherein the at least one initialization comparison comprises a location test in which a location data comparison is made between initializing location information and at least part of the stored location information, and wherein the at least one initialization message includes a location test signal that causes a new service user test to be conducted when the location data comparison is not within predetermined specifications.

22. The system of claim 17, wherein the data processor is configured and programmed to generate one or more initializing control signals based upon one or more initialization comparisons, including the voice comparison, and communicate the initializing control signal to at least one controllable part of the vehicle, wherein the controllable part is adapted to be controlled in some respect based upon the initializing control signal.

23. A method of operation for a wireless vehicle location and emergency notification system comprising the steps of: placing one or more components of a mobile unit within or on the outside of a vehicle; providing electric power for operation of at least one of the mobile unit components when no electric power is available from the vehicle's electrical system, and providing electric power for operation of at least one component of at least one base station when no electric power is available to the at least one base station from any external power line; maintaining a communication link between the mobile unit and at least one of the base stations, with the communication link being available on a substantially continuous basis; maintaining a navigational communication link between the mobile unit and one or more global positioning satellites, with the navigational link being available on a substantially continuous basis; detecting the static and dynamic proximity of the vehicle to an undesirable event, wherein said detecting comprises the steps of sensing the vehicle location using a global position receiver carried within or on the outside of the vehicle, wherein the global position receiver receives navigational signals from the one or more global positioning satellites; sensing at least one vehicle condition using at least one

vehicle condition sensor; creating a computer data base comprising predetermined calibrated parameters that include static and dynamic values for relationships between the sensed vehicle locations and predetermined locations and between at least one sensed vehicle condition and predetermined vehicle conditions, and storing the data base in computer memory, which memory is accessible to a data processor; performing a main program loop using the data processor, the data processor being configured and programmed to perform the loop on a substantially continuous basis while the data processor is being operated, wherein performing the loop comprises one or more cycles through the loop wherein each of the cycles comprises the steps of comparing at least one of the sensed vehicle locations with at least one of the parameters, and comparing at least one of the sensed vehicle conditions with at least one of the parameters; and, generating one or more emergency response signals when the result of either of the two immediately preceding steps indicates, based on pre-established criteria, that an undesirable event is impending; and, sending the one or more emergency response signals to one or more communication devices for notifying the user or the base station, or both the user and the base station, about the status of the vehicle or of the user, or of both the vehicle and the user, vis-a-vis the event.

24. The method of claim 23, further comprising the steps of: detecting when the user is taking action to begin using the vehicle; performing an initialization procedure before allowing the user to use the vehicle, wherein the initialization procedure comprises the steps of determining if a vehicle user is an authorized user before allowing the user to use the vehicle, wherein said determining of an authorized user step comprises the steps of requiring the user to speak into a sound detecting device that is in electronic communication with a data processor, which data processor is configured and programmed for and performs the steps of receiving voice signal information from the sound detecting device, accessing stored computer voice information that is suitable for identifying the voice of at least one authorized user, verifying whether the user's voice is the voice of an authorized user by comparing the voice signal information to the stored computer voice information, and, if the voice comparison resulted in the user's voice not being recognized as the voice of one of the authorized users, generating a user invalidity signal, sending the user invalidity signal to the base station or to the authorized user, or to the base station and the authorized user, and denying the use of at least one mobile unit part, at least one vehicle part, or any combination of mobile unit parts and vehicle parts, by sending at least one control signal to effectuate said denial of use.

L18: Entry 2 of 4 File: USPT Oct 17, 2000

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TITLE: System and method for measuring physical parameters using an integrated multisensor system

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U.S. PATENT DOCUMENTS

Search Selected Search ALL Clear

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
5623411	April 1997	Morvan	701/14
5737222	April 1998	Palmer	701/14
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ABSTRACT:

A system and method for analyzing physical parameters of flight data at a plurality of discrete locations about a surface of an aircraft includes a multisensor system having an array of belts. Each belt includes a plurality of interconnected belt segments including a substrate having an electrically conductive digital data bus, and at least one module having a first sensor, a second sensor and a digital signal processor, and a coating for protecting the belt segment. The first and second sensors, which are preferably formed as microelectromechanical sensors sharing a common substrate, respectively generate signals representative of a first physical parameter and a second physical parameter. The processor receives and analyzes the first and second signals to generate a third signal. The third signal is transmitted along the electrically-conductive bus to a remotely-located controller. The controller analyzes the third signal to obtain flight status information relating to the effect of the physical parameters on the flight.

29 Claims, 8 Drawing figures

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L18: Entry 2 of 4 File: USPT Oct 17, 2000

DOCUMENT-IDENTIFIER: US 6134485 A
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TITLE: System and method for measuring physical parameters using an integrated multisensor system

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Brief Summary Text (9):
A system and method for measuring physical parameters at a plurality of discrete locations about a surface of an object is provided. The system comprises a multisensor system including at least one belt segment having a plurality of sensors and processors in communication with a remotely-located controller along an electrically-conductive, bidirectional digital data transfer bus. For example, where the system is applied to collect aircraft flight data, a plurality of interconnected belt segments are disposed about the body, wings, nacelle, tail and engine of the aircraft to provide measurements of various physical parameters during a flight loads survey of an aircraft configuration. The multisensor system may be used in a variety of different applications, including measuring physical parameters about the rotors of a helicopter, about the hull of a boat or submarine, and about the body of an automobile.

Brief Summary Text (10):
In accordance with the invention, each belt segment includes a polymeric tape carrier having integrally-formed wire traces defining a portion of the system's electrically-conductive bidirectional digital data bus; two or more parameter-sensing modules affixed to the tape carrier in electrical communication with the bidirectional digital data bus; and a coating for protecting the tape carrier and the modules from environmental conditions, as well as to provide the belt segment with improved aerodynamic properties. Where the physical parameters are to be measured as the object moves through a given fluid, the tape carrier has a generally planar surface and a nominal thickness that is significantly less than the boundary separation layer defined upon movement of the object through the fluid. In this manner, the belt segment is provided with a reduced aerodynamic profile to allow for more accurate physical parameter measurements.

Brief Summary Text (13):
Each of the modules affixed to the tape carrier includes a pair of sensors, each sensor generating an analog signal representative of its respective physical parameter; an analog integrated circuit (IC) to provide signal conditioning for the analog signal generated by each sensor; a memory IC; an analog-to-digital converter; and a digital signal processor. Interconnection leads provide electrical communication between the digital signal processor of each module to the data bus defined in the tape carriers, thereby providing communication pathways between the modules and the NCAP.

Brief Summary Text (17):
A digital signal processor is affixed to each module proximate to the location of the first sensor. The processor receives and analyzes the physical parameter signals respectively generated by the module's pair of first and second sensors.

The processor itself is in electrical communication with the bidirectional digital data bus through electrical interconnection paths, such as tape automated bonds (TAB), whereby the processor transmits both the processor node address and the third processed digital signal along the tape carrier's integrated bidirectional data bus to the network capable application processor (NCAP).

Brief Summary Text (18):
A remotely-located controller, normally disposed within the airframe of an aircraft, is electrically connected to the bidirectional digital data buses of the one or more belt segments. In a preferred embodiment, the controller is part of the network-capable application processing device (NCAP). The controller communicates with each belt segment's modules to collect the third signal generated by each digital signal processor. The controller analyzes the collected third signals based on a predetermined set of instructions. The controller communicates with the modules using a standard protocol over the system's shared electrically-conductive digital data buses.

Brief Summary Text (19):
In a preferred embodiment, the controller assesses the integrity of the third signals generated by the digital signal processor of each module, as well as sending commands to the module about when a measurement should be taken and verifying the health status of the plurality of modules. Alternatively, the controller can forward the data to the instruments on the aircraft to provide flight status information during operation of the aircraft. Additionally, the controller may store the physical parameter data collected during aircraft flight, possibly to be downloaded by aircraft maintenance support personnel after completion of the flight. The controller may also transmit the physical parameter data via a wireless interface to the ground.

Drawing Description Text (9):
FIG. 8 is a diagrammatic schematic of the exemplary system illustrating the communication pathways of the electrically-conductive data bus including the interface module between the array of belt segments and the remotely-located controller.

Detailed Description Text (9):
It will be appreciated, however, that, depending upon the application to which the multisensor system of the invention is being put, the first and second sensors 42,44 may generate analog signals representative of other sensed physical
5:28-43 parameters, including, without limitation, acceleration, chemical environment, mechanical stress, mechanical strain and component aging. In this regard, each module 22 may also advantageously include additional sensor mounting locations 46 on either side of the center-mounted sensors 42,44. Additional sensors may thus be mounted on either side of the first and second sensors 42,44 for measuring additional physical parameters, including evaluating the differences in the first and second sensor's stress sensitivity. Where desired, the invention contemplates use of suitable mechanisms for mechanically isolating a given sensor from the tape carrier 20 to improve sensor performance.

Detailed Description Text (11):
The bottom portion 52 of the MEMS 46 includes a cavity 56 defined within a reference support 58. The reference support 58 is designed to allow flip chip bonding of the MEMS 46 to the module substrate 40 of the module 22. The MEMS 46 is mounted to the module 22 using solder bumps or conductive epoxy. The use of flip chip bonding keeps the profile of the module-mounted MEMS 46 to about 0.41 mm (0.016 inches) thick. The reference support 58 advantageously provides feedthroughs so that electrical connections can be made from the backside of the MEMS 46. The feedthroughs consist of etched holes through the reference support 58. A suitable barrier metal, such as gold, is deposited through the etched holes, creating electrical pads on the surface of the reference support 58 to connect them to the

pads of the surface micromachined sensors 42,44.

Detailed Description Text (14):
Each module 22 further includes a memory IC 64, an analog-to-digital converter, a digital signal processor 66, and associated circuitry, indicated generally at 68, for electrically interconnecting the first and second sensors 42,44 with the other module components 60,64,66. The digital signal processor 66 communicates with the bidirectional data bus 36 defined in the tape carrier 20, and power is provided to module components, via suitable electrical interconnection paths 70. By way of example only, in the exemplary system 10, the electrical interconnection path 70 is provided by tape automated bonds (TAB).

Detailed Description Text (19):
A diagrammatic schematic overview of the exemplary system 10 is illustrated in FIG. 8. In FIG. 8, the array of interconnected belts 14, themselves disposed about the surface of the aircraft 12 to thereby place the parameter-sensing modules 22 of each constituent belt segment 18 at a plurality of discrete locations about the surface of the airframe (not shown). The bidirectional data bus 36 defined by the interconnected belts 14 is itself connected to a remotely-located controller 38. In a constructed embodiment of the exemplary system 10, the controller 38 is part of a network capable application processor (NCAP), indicated generally at 74, which can be connected to a communication network used to

Detailed Description Text (20):
interface to a host computer, indicated generally at 76. In an alternative embodiment, the controller 38 can be configured as a host computer to interface directly with the communication network without the use of the network capable application processor.

Detailed Description Text (21):
As noted above, the digital signal processor 66 of each segment-mounted module 22 communicates with the remotely-located controller 38 across the bidirectional data bus 36 integrally-formed within each belt's tape carrier 20. The data bus 36 includes a high speed bus and a low speed bus for communication between each module's digital signal processor 66 and the controller 38. The high speed data bus is used for time-critical operations such as data transfers between each digital signal processor 66 and the controller 38, sample synchronization and memory download/self-identification protocols. The low speed data bus is used for non-time critical operations, such as command and status operations, as well as support of the self-identification protocol.

Detailed Description Text (23):
The controller 38 preferably includes a control program and a downloader program to interface the controller 38 with each digital signal processor 66. The control program is designed to support initial checkout between each digital signal processor 66 and the controller 38. The control program provides integrated access to the high speed and low speed data buses 36. The downloader program supports the interface between each digital signal processor 66 and the controller 38, as well as processor memory upload and download access via the low speed bus. Each of the programs on the controller 38 use a command-line based interactive design to allow a user to enter commands to be carried out by the software. Information gathered by the controller 38 can then be transmitted along a communications network to the host computer 76 to report flight status information. The controller 38 assesses the integrity of the signals received from each digital signal processor 66. The controller 38 additionally sends commands to each digital signal processor 66, instructing each processor as to when a parameter measurement should be taken and verifying the health status of each module 22.

Detailed Description Text (26):
Additionally, digital signal processor 66 can transmit data taken from sensors

42,44, or other sensors resident on module 22 as described above, which may be combined through a predetermined method to generate additional digital signals. These additional signals may preferably be communicated to controller 38 on separate channels in the data bus 36.

Detailed Description Text (27):
In accordance with the invention, in the exemplary method, the controller 38 sends instructions to each digital signal processor 66 along the data bus 36 to transmit the third digital signal generated by the digital signal processor 66 of each module 22. The controller 38 collects the thus-transmitted digital third signals, as well as the specific node address of each digital signal processor 66. The controller 38 analyzes the collected third signals based on a predetermined set of instructions. The controller 38 then forwards the data from the signals on to a host computer 76 through the network capable application processor 74 in a communication network to provide flight status information during operation of the aircraft 12. Alternatively, the controller 38 may be configured to act as a host computer to analyze the flight status information during the operation of the aircraft 12. Additionally, the controller 38 may collect physical parameter data during the aircraft flight and store such data in suitable memory (not shown), to be downloaded by aircraft maintenance support personnel after completion of the flight. The controller 38 may also transmit the collected physical parameter data via a wireless interface to the ground.

Detailed Description Text (28):
While embodiments of the invention have been illustrated and described, it is not intended that these embodiments illustrate and describe all possible forms of the invention. Rather, the words used in the specification are words of description rather than limitation, and it is understood that various changes may be made without departing from the spirit and scope of the invention. For example, while the invention has been described in the context of an aircraft's flight data survey, it will be appreciated that the multisensor system 10 may be used in testing systems for other modes of transportation, including measuring physical parameters about the rotors of a helicopter, about the hull of a boat or submarine, or about the body of an automobile. Additionally, while each module 22 on a given belt segment is illustrated in the Drawings as completely overlying the tape carrier 20, the invention contemplates use of belt segments 18 whose parameter-sensing modules 22 extend, for example, laterally beyond the confines of the tape carrier 20. Thus, for example, where one of the physical parameters to be measured with the multisensor system is mechanical strain, the MEMS 46 may preferably extend laterally beyond the tape carrier 20 to thereby mechanically isolate the module-mounted sensors from the tape carrier 20 and, hence, improve the sensitivity of the multisensor system.

Current US Cross Reference Classification (6):
701/1

Current US Cross Reference Classification (7):
701/2

CLAIMS:

1. A multisensor system for measuring physical parameters at a plurality of discrete locations about a surface of an object, the system comprising:

at least one belt segment, wherein each belt segment includes an electrically-conductive data bus that is in communication with the data bus of another belt segment;

a plurality of parameter-sensing modules mounted at a plurality of positions on each belt segment corresponding to the discrete locations, each module including a

first sensor for generating a first signal representative of a first one of the physical parameters, a second sensor for generating a second signal representative of a second one of the physical parameters, and a processor in electrical communication with the data bus, receiving the first and second signals and generating a third signal based on the first and second signals, wherein the third signal is a digital signal; and

a controller connected to the data bus for selectively receiving the third signal from the processor of each of the modules.

15. A multisensor system for measuring physical parameters of flight data at a plurality of discrete locations about a surface of an aircraft, the system comprising:

at least two belt segments, wherein each belt segment includes a connecting portion at each end of the segment to interconnect the belt segments, wherein each belt segment includes an electrically-conductive data bus that is in communication with the data bus of another belt segment;

a plurality of modules disposed on each of the belt segments, wherein each module includes a first sensor for generating a first signal representative of a first one of the physical parameters, a second sensor for generating a second signal representative of a second one of the physical parameters, and a processor receiving the first and second signals and generating a third, digital signal based on the first and second signals, the processor being in electrical communication with the data bus;

a remote controller connected to the data bus for receiving the third signal generated by the processor of each of the plurality of modules.

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Search Results - Record(s) 1 through 2 of 2 returned.

☑ 1. Document ID: US 6192303 B1

L22: Entry 1 of 2 File: USPT Feb 20, 2001

US-PAT-NO: 6192303
DOCUMENT-IDENTIFIER: US 6192303 B1

TITLE: Vehicle diagnosing apparatus

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw. De

☐ 2. Document ID: US 6048271 A

L22: Entry 2 of 2 File: USPT Apr 11, 2000

US-PAT-NO: 6048271
DOCUMENT-IDENTIFIER: US 6048271 A

TITLE: Automated league and tournament device

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw. De

Clear | Generate Collection | Print | Fwd Refs | Bkwd Refs | Generate OACS

Terms	Documents
@ad<=20000215 and ((wireless$ with (build$ or made or manufact$) with communicat$) with diagnos$)	2

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Search Results -

Terms	Documents
@ad<=20000215 and ((wireless$ with (build$ or made or manufact$) with communicat$) with diagnos$)	2

Database:

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US OCR Full-Text Database
EPO Abstracts Database
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Derwent World Patents Index
IBM Technical Disclosure Bulletins

Search: L22

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Recall Text | Clear | Interrupt

Search History

DATE: Tuesday, March 15, 2005 Printable Copy Create Case

Set Name side by side	Query	Hit Count	Set Name result set
	DB=USPT; THES=ASSIGNEE; PLUR=YES; OP=OR		
L22	@ad<=20000215 and ((wireless$ with (build$ or made or manufact$) with communicat$) with diagnos$)	2	L22
L21	L20 not l15	11	L21
L20	L19 not l18	11	L20
L19	@ad<=20000215 and ((wireless$ with (build$ or made or manufact$) with communicat$) same diagnos$)	11	L19
L18	L14 and 701/?.ccls.	4	L18
L17	L15 and 701/?.ccls.	0	L17
L16	L15 and diagnos$	2	L16
L15	L14 and (manufacturer with communicat$)	6	L15
L14	(acceler$ with (signal$ or condition$)) and @ad<=20000215 and (wireless$ and (build$ or made or manufact$) and communicat$)	496	L14

L13	L6 and (wireless$ and (build$ or made or manufact$) and communicat$)	1	L13
L12	L9 and (wireless$ and (build$ or made or manufact$) and communicat$)	0	L12
L11	L9 and (wireless$ same (build$ or made or manufact$) same communicat$)	0	L11
L10	L9 and (wireless$ same manufact$ same communicat$)	0	L10
L9	L7 and (vehicle same diagnos$)	18	L9
L8	L7 and wireless$	1	L8
L7	L6 and diagnos$	24	L7
L6	(acceler$ with (signal$ or condition$)) and obd and @ad<=20000215	26	L6
L5	(acceler$ with (signal$ or condition$)) and 701/?.ccls. and obd and @ad<=20000215	0	L5
L4	L3 and accele$	0	L4
L3	5884202.pn. or 6362730.pn. or 6351221.pn.	3	L3
L2	L1 and accelerat$	1	L2
L1	5884202.pn. or 6362720.pn. or 6351221.pn.	3	L1

END OF SEARCH HISTORY

L18: Entry 2 of 4 File: USPT Oct 17, 2000

DOCUMENT-IDENTIFIER: US 6134485 A
**** See image for Certificate of Correction ****
TITLE: System and method for measuring physical parameters using an integrated multisensor system

Application Filing Date (1):
19990218

Brief Summary Text (9):
A system and method for measuring physical parameters at a plurality of discrete locations about a surface of an object is provided. The system comprises a multisensor system including at least one belt segment having a plurality of sensors and processors in communication with a remotely-located controller along an electrically-conductive, bidirectional digital data transfer bus. For example, where the system is applied to collect aircraft flight data, a plurality of interconnected belt segments are disposed about the body, wings, nacelle, tail and engine of the aircraft to provide measurements of various physical parameters during a flight loads survey of an aircraft configuration. The multisensor system may be used in a variety of different applications, including measuring physical parameters about the rotors of a helicopter, about the hull of a boat or submarine, and about the body of an automobile.

Brief Summary Text (10):
In accordance with the invention, each belt segment includes a polymeric tape carrier having integrally-formed wire traces defining a portion of the system's electrically-conductive bidirectional digital data bus; two or more parameter-sensing modules affixed to the tape carrier in electrical communication with the bidirectional digital data bus; and a coating for protecting the tape carrier and the modules from environmental conditions, as well as to provide the belt segment with improved aerodynamic properties. Where the physical parameters are to be measured as the object moves through a given fluid, the tape carrier has a generally planar surface and a nominal thickness that is significantly less than the boundary separation layer defined upon movement of the object through the fluid. In this manner, the belt segment is provided with a reduced aerodynamic profile to allow for more accurate physical parameter measurements.

Brief Summary Text (13):
Each of the modules affixed to the tape carrier includes a pair of sensors, each sensor generating an analog signal representative of its respective physical parameter; an analog integrated circuit (IC) to provide signal conditioning for the analog signal generated by each sensor; a memory IC; an analog-to-digital converter; and a digital signal processor. Interconnection leads provide electrical communication between the digital signal processor of each module to the data bus defined in the tape carriers, thereby providing communication pathways between the modules and the NCAP.

Brief Summary Text (17):
A digital signal processor is affixed to each module proximate to the location of the first sensor. The processor receives and analyzes the physical parameter signals respectively generated by the module's pair of first and second sensors.

The processor itself is in electrical communication with the bidirectional digital data bus through electrical interconnection paths, such as tape automated bonds (TAB), whereby the processor transmits both the processor node address and the third processed digital signal along the tape carrier's integrated bidirectional data bus to the network capable application processor (NCAP).

Brief Summary Text (18):
A remotely-located controller, normally disposed within the airframe of an aircraft, is electrically connected to the bidirectional digital data buses of the one or more belt segments. In a preferred embodiment, the controller is part of the network-capable application processing device (NCAP). The controller communicates with each belt segment's modules to collect the third signal generated by each digital signal processor. The controller analyzes the collected third signals based on a predetermined set of instructions. The controller communicates with the modules using a standard protocol over the system's shared electrically-conductive digital data buses.

Brief Summary Text (19):
In a preferred embodiment, the controller assesses the integrity of the third signals generated by the digital signal processor of each module, as well as sending commands to the module about when a measurement should be taken and verifying the health status of the plurality of modules. Alternatively, the controller can forward the data to the instruments on the aircraft to provide flight status information during operation of the aircraft. Additionally, the controller may store the physical parameter data collected during aircraft flight, possibly to be downloaded by aircraft maintenance support personnel after completion of the flight. The controller may also transmit the physical parameter data via a wireless interface to the ground.

Drawing Description Text (9):
FIG. 8 is a diagrammatic schematic of the exemplary system illustrating the communication pathways of the electrically-conductive data bus including the interface module between the array of belt segments and the remotely-located controller.

Detailed Description Text (9):
It will be appreciated, however, that, depending upon the application to which the multisensor system of the invention is being put, the first and second sensors 42,44 may generate analog signals representative of other sensed physical parameters, including, without limitation, acceleration, chemical environment, mechanical stress, mechanical strain and component aging. In this regard, each module 22 may also advantageously include additional sensor mounting locations 46 on either side of the center-mounted sensors 42,44. Additional sensors may thus be mounted on either side of the first and second sensors 42,44 for measuring additional physical parameters, including evaluating the differences in the first and second sensor's stress sensitivity. Where desired, the invention contemplates use of suitable mechanisms for mechanically isolating a given sensor from the tape carrier 20 to improve sensor performance.

Detailed Description Text (11):
The bottom portion 52 of the MEMS 46 includes a cavity 56 defined within a reference support 58. The reference support 58 is designed to allow flip chip bonding of the MEMS 46 to the module substrate 40 of the module 22. The MEMS 46 is mounted to the module 22 using solder bumps or conductive epoxy. The use of flip chip bonding keeps the profile of the module-mounted MEMS 46 to about 0.41 mm (0.016 inches) thick. The reference support 58 advantageously provides feedthroughs so that electrical connections can be made from the backside of the MEMS 46. The feedthroughs consist of etched holes through the reference support 58. A suitable barrier metal, such as gold, is deposited through the etched holes, creating electrical pads on the surface of the reference support 58 to connect them to the

pads of the surface micromachined sensors 42,44.

Detailed Description Text (14):
Each module 22 further includes a memory IC 64, an analog-to-digital converter, a digital signal processor 66, and associated circuitry, indicated generally at 68, for electrically interconnecting the first and second sensors 42,44 with the other module components 60,64,66. The digital signal processor 66 communicates with the bidirectional data bus 36 defined in the tape carrier 20, and power is provided to module components, via suitable electrical interconnection paths 70. By way of example only, in the exemplary system 10, the electrical interconnection path 70 is provided by tape automated bonds (TAB).

Detailed Description Text (19):
A diagrammatic schematic overview of the exemplary system 10 is illustrated in FIG. 8. In FIG. 8, the array of interconnected belts 14, themselves disposed about the surface of the aircraft 12 to thereby place the parameter-sensing modules 22 of each constituent belt segment 18 at a plurality of discrete locations about the surface of the airframe (not shown). The bidirectional data bus 36 defined by the interconnected belts 14 is itself connected to a remotely-located controller 38. In a constructed embodiment of the exemplary system 10, the controller 38 is part of a network capable application processor (NCAP), indicated generally at 74, which can be connected to a communication network used to

Detailed Description Text (20):
interface to a host computer, indicated generally at 76. In an alternative embodiment, the controller 38 can be configured as a host computer to interface directly with the communication network without the use of the network capable application processor.

Detailed Description Text (21):
As noted above, the digital signal processor 66 of each segment-mounted module 22 communicates with the remotely-located controller 38 across the bidirectional data bus 36 integrally-formed within each belt's tape carrier 20. The data bus 36 includes a high speed bus and a low speed bus for communication between each module's digital signal processor 66 and the controller 38. The high speed data bus is used for time-critical operations such as data transfers between each digital signal processor 66 and the controller 38, sample synchronization and memory download/self-identification protocols. The low speed data bus is used for non-time critical operations, such as command and status operations, as well as support of the self-identification protocol.

Detailed Description Text (23):
The controller 38 preferably includes a control program and a downloader program to interface the controller 38 with each digital signal processor 66. The control program is designed to support initial checkout between each digital signal processor 66 and the controller 38. The control program provides integrated access to the high speed and low speed data buses 36. The downloader program supports the interface between each digital signal processor 66 and the controller 38, as well as processor memory upload and download access via the low speed bus. Each of the programs on the controller 38 use a command-line based interactive design to allow a user to enter commands to be carried out by the software. Information gathered by the controller 38 can then be transmitted along a communications network to the host computer 76 to report flight status information. The controller 38 assesses the integrity of the signals received from each digital signal processor 66. The controller 38 additionally sends commands to each digital signal processor 66, instructing each processor as to when a parameter measurement should be taken and verifying the health status of each module 22.

Detailed Description Text (26):
Additionally, digital signal processor 66 can transmit data taken from sensors

42,44, or other sensors resident on module 22 as described above, which may be combined through a predetermined method to generate additional digital signals. These additional signals may preferably be communicated to controller 38 on separate channels in the data bus 36.

Detailed Description Text (27):
In accordance with the invention, in the exemplary method, the controller 38 sends instructions to each digital signal processor 66 along the data bus 36 to transmit the third digital signal generated by the digital signal processor 66 of each module 22. The controller 38 collects the thus-transmitted digital third signals, as well as the specific node address of each digital signal processor 66. The controller 38 analyzes the collected third signals based on a predetermined set of instructions. The controller 38 then forwards the data from the signals on to a host computer 76 through the network capable application processor 74 in a communication network to provide flight status information during operation of the aircraft 12. Alternatively, the controller 38 may be configured to act as a host computer to analyze the flight status information during the operation of the aircraft 12. Additionally, the controller 38 may collect physical parameter data during the aircraft flight and store such data in suitable memory (not shown), to be downloaded by aircraft maintenance support personnel after completion of the flight. The controller 38 may also transmit the collected physical parameter data via a wireless interface to the ground.

Detailed Description Text (28):
While embodiments of the invention have been illustrated and described, it is not intended that these embodiments illustrate and describe all possible forms of the invention. Rather, the words used in the specification are words of description rather than limitation, and it is understood that various changes may be made without departing from the spirit and scope of the invention. For example, while the invention has been described in the context of an aircraft's flight data survey, it will be appreciated that the multisensor system 10 may be used in testing systems for other modes of transportation, including measuring physical parameters about the rotors of a helicopter, about the hull of a boat or submarine, or about the body of an automobile. Additionally, while each module 22 on a given belt segment is illustrated in the Drawings as completely overlying the tape carrier 20, the invention contemplates use of belt segments 18 whose parameter-sensing modules 22 extend, for example, laterally beyond the confines of the tape carrier 20. Thus, for example, where one of the physical parameters to be measured with the multisensor system is mechanical strain, the MEMS 46 may preferably extend laterally beyond the tape carrier 20 to thereby mechanically isolate the module-mounted sensors from the tape carrier 20 and, hence, improve the sensitivity of the multisensor system.

Current US Cross Reference Classification (6):
701/1

Current US Cross Reference Classification (7):
701/2

CLAIMS:

1. A multisensor system for measuring physical parameters at a plurality of discrete locations about a surface of an object, the system comprising:

at least one belt segment, wherein each belt segment includes an electrically-conductive data bus that is in communication with the data bus of another belt segment;

a plurality of parameter-sensing modules mounted at a plurality of positions on each belt segment corresponding to the discrete locations, each module including a

first sensor for generating a first signal representative of a first one of the physical parameters, a second sensor for generating a second signal representative of a second one of the physical parameters, and a processor, in electrical communication with the data bus, receiving the first and second signals and generating a third signal based on the first and second signals, wherein the third signal is a digital signal; and

a controller connected to the data bus for selectively receiving the third signal from the processor of each of the modules.

15. A multisensor system for measuring physical parameters of flight data at a plurality of discrete locations about a surface of an aircraft, the system comprising:

at least two belt segments, wherein each belt segment includes a connecting portion at each end of the segment to interconnect the belt segments, wherein each belt segment includes an electrically-conductive data bus that is in communication with the data bus of another belt segment;

a plurality of modules disposed on each of the belt segments, wherein each module includes a first sensor for generating a first signal representative of a first one of the physical parameters, a second sensor for generating a second signal representative of a second one of the physical parameters, and a processor receiving the first and second signals and generating a third, digital signal based on the first and second signals, the processor being in electrical communication with the data bus;

a remote controller connected to the data bus for receiving the third signal generated by the processor of each of the plurality of modules.

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Search Results - Record(s) 1 through 10 of 24 returned.

☐ 1. Document ID: US 6526340 B1

L7: Entry 1 of 24 File: USPT Feb 25, 2003

US-PAT-NO: 6526340
DOCUMENT-IDENTIFIER: US 6526340 B1

TITLE: Multi-vehicle communication interface

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw. De

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☐ 2. Document ID: US 6497092 B1

L7: Entry 2 of 24 File: USPT Dec 24, 2002

US-PAT-NO: 6497092
DOCUMENT-IDENTIFIER: US 6497092 B1
**** See image for Certificate of Correction ****

TITLE: NOx absorber diagnostics and automotive exhaust control system utilizing the same

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw. De

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☐ 3. Document ID: US 6378359 B1

L7: Entry 3 of 24 File: USPT Apr 30, 2002

US-PAT-NO: 6378359
DOCUMENT-IDENTIFIER: US 6378359 B1

TITLE: Method and system for evaluating exhaust on-board diagnostics system

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw. De

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☐ 4. Document ID: US 6357287 B1

L7: Entry 4 of 24 File: USPT Mar 19, 2002

US-PAT-NO: 6357287
DOCUMENT-IDENTIFIER: US 6357287 B1

TITLE: System and method for detecting engine misfire using frequency analysis

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw De

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☐ 5. Document ID: US 6278934 B1

L7: Entry 5 of 24 File: USPT Aug 21, 2001

US-PAT-NO: 6278934
DOCUMENT-IDENTIFIER: US 6278934 B1
**** See image for Certificate of Correction ****

TITLE: System and method for detecting engine misfires using optimal phase delay angle

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw De

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☐ 6. Document ID: US 6224493 B1

L7: Entry 6 of 24 File: USPT May 1, 2001

US-PAT-NO: 6224493
DOCUMENT-IDENTIFIER: US 6224493 B1

TITLE: Instrumented golf club system and method of use

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw De

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☐ 7. Document ID: US 6202406 B1

L7: Entry 7 of 24 File: USPT Mar 20, 2001

US-PAT-NO: 6202406
DOCUMENT-IDENTIFIER: US 6202406 B1
**** See image for Certificate of Correction ****

TITLE: Method and apparatus for catalyst temperature control

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw De

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☐ 8. Document ID: US 6171565 B1

L7: Entry 8 of 24 File: USPT Jan 9, 2001

US-PAT-NO: 6171565
DOCUMENT-IDENTIFIER: US 6171565 B1

TITLE: Process for the operation of a nitrogen oxides storage catalyst

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw De

9. Document ID: US 6151547 A

L7: Entry 9 of 24 File: USPT Nov 21, 2000

US-PAT-NO: 6151547

DOCUMENT-IDENTIFIER: US 6151547 A

TITLE: Air/fuel ratio manipulation code for optimizing dynamic emissions

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw De

10. Document ID: US 6085142 A

L7: Entry 10 of 24 File: USPT Jul 4, 2000

US-PAT-NO: 6085142

DOCUMENT-IDENTIFIER: US 6085142 A

TITLE: Calibration method for a fuel injection system

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw De

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Terms	Documents
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Search Results - Record(s) 11 through 20 of 24 returned.

☐ 11. Document ID: US 6078861 A
L7: Entry 11 of 24 File: USPT Jun 20, 2000

US-PAT-NO: 6078861
DOCUMENT-IDENTIFIER: US 6078861 A

TITLE: Onboard diagnostic monitoring for flexible fuel vehicles

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw. De

☐ 12. Document ID: US 6036827 A
L7: Entry 12 of 24 File: USPT Mar 14, 2000

US-PAT-NO: 6036827
DOCUMENT-IDENTIFIER: US 6036827 A

TITLE: Electrolyzer

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw. De

☐ 13. Document ID: US 6009742 A
L7: Entry 13 of 24 File: USPT Jan 4, 2000

US-PAT-NO: 6009742
DOCUMENT-IDENTIFIER: US 6009742 A

TITLE: Multi-channel pellistor type emission sensor

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw. De

☐ 14. Document ID: US 6003307 A
L7: Entry 14 of 24 File: USPT Dec 21, 1999

US-PAT-NO: 6003307
DOCUMENT-IDENTIFIER: US 6003307 A

TITLE: OBD calorimetric sensor system with offset error correction

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw De

15. Document ID: US 5996337 A

L7: Entry 15 of 24 File: USPT Dec 7, 1999

US-PAT-NO: 5996337
DOCUMENT-IDENTIFIER: US 5996337 A

TITLE: Dynamic calorimetric sensor system

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw De

16. Document ID: US 5979407 A

L7: Entry 16 of 24 File: USPT Nov 9, 1999

US-PAT-NO: 5979407
DOCUMENT-IDENTIFIER: US 5979407 A

TITLE: Passive and active misfire diagnosis for internal combustion engines

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw De

17. Document ID: US 5964812 A

L7: Entry 17 of 24 File: USPT Oct 12, 1999

US-PAT-NO: 5964812
DOCUMENT-IDENTIFIER: US 5964812 A

TITLE: Evaporative emissions leak detection system and method utilizing on-vehicle dynamic measurements

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw De

18. Document ID: US 5964089 A

L7: Entry 18 of 24 File: USPT Oct 12, 1999

US-PAT-NO: 5964089
DOCUMENT-IDENTIFIER: US 5964089 A

TITLE: Diagnostics and control of an on board hydrogen generation and delivery system

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw De

☐ 19. Document ID: US 5941918 A

L7: Entry 19 of 24 File: USPT Aug 24, 1999

US-PAT-NO: 5941918
DOCUMENT-IDENTIFIER: US 5941918 A

TITLE: Automotive on-board monitoring system for catalytic converter evaluation

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw De

☐ 20. Document ID: US 5751602 A

L7: Entry 20 of 24 File: USPT May 12, 1998

US-PAT-NO: 5751602
DOCUMENT-IDENTIFIER: US 5751602 A

TITLE: Method of monitoring the operation of a catalytic converter

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw De

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Search Results - Record(s) 21 through 24 of 24 returned.

☐ 21. Document ID: US 5732382 A

L7: Entry 21 of 24 File: USPT Mar 24, 1998

US-PAT-NO: 5732382
DOCUMENT-IDENTIFIER: US 5732382 A

TITLE: Method for identifying misfire events of an internal combustion engine

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw De

☐ 22. Document ID: US 5627757 A

L7: Entry 22 of 24 File: USPT May 6, 1997

US-PAT-NO: 5627757
DOCUMENT-IDENTIFIER: US 5627757 A

TITLE: System for monitoring the efficiency of a catalyst, in particular for motor vehicles

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw De

☐ 23. Document ID: US 5610844 A

L7: Entry 23 of 24 File: USPT Mar 11, 1997

US-PAT-NO: 5610844
DOCUMENT-IDENTIFIER: US 5610844 A

TITLE: Method of monitoring the operation of a catalytic converter

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw De

☐ 24. Document ID: US 5515281 A

L7: Entry 24 of 24 File: USPT May 7, 1996

US-PAT-NO: 5515281
DOCUMENT-IDENTIFIER: US 5515281 A

TITLE: Process and system for detecting misfiring in internal combustion engines

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw De

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Terms	Documents
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L16: Entry 2 of 2 File: USPT Jul 4, 2000

DOCUMENT-IDENTIFIER: US 6083248 A
**** See image for Certificate of Correction ****
TITLE: World wide patient location and data telemetry system for implantable medical devices

Abstract Text (1):
A system for communicating with a medical device implanted in an ambulatory patient and for locating the patient in order to selectively monitor device function, alter device operating parameters and modes and provide emergency assistance to and communications with a patient. The implanted device includes a telemetry transceiver for communicating data and operating instructions between the implanted device and an external patient communications control device that is either worn by or located in proximity to the patient within the implanted device tranceiving range. The control device preferably includes a communication link with a remote medical support network, a global positioning satellite receiver for receiving positioning data identifying the global position of the control device, and a patient activated link for permitting patient initiated personal communication with the medical support network. A system controller in the control device controls data and voice communications for selectively transmitting patient initiated personal communications and

Abstract Text (2):
global positioning data to the medical support network, for initiating telemetry out of data and operating commands from the implanted device and transmission of the same to the medical support network, and for receiving and initiating re-programming of the implanted device operating modes and parameters in response to instructions received from the medical support network. The communications link between the medical support network and the patient communications control device may comprise a world wide satellite network, hard-wired telephone network, a cellular telephone network or other personal communications system. Methods and apparatae are also described that enhance the ability of the medical system to find patients and to get reports on patient and medical device status, and even update medical device programming using such facilities, and others described in detail within.

Application Filing Date (1):
19981124

Brief Summary Text (2):
The present invention relates to communication systems for communicating with an implanted medical device or device system, and more particularly, such a communication system that may function on a world wide basis at any time to communicate patient location, device monitoring data, device re-programming data and to allow for effective response to emergency conditions.

Brief Summary Text (3):
The following references were cited in commonly assigned, U.S. Pat. No. 5,683,432 for ADAPTIVE, PERFORMANCE-OPTIMIZING COMMUNICATION SYSTEM FOR COMMUNICATING WITH AN

IMPLANTABLE DEVICE by S. Goedeke et al. to indicate the prior state of the art in such matters. In particular, in reed switch use U.S. Pat. No. 3,311,111 to Bowers, U.S. Pat. No, 3,518,997 to Sessions, U.S. Pat. No. 3,623,486 to Berkovits, U.S. Pat. No, 3,631,860 to Lopin, U.S. Pat. No., 3,738,369 to Adams et al., U.S. Pat. No. 3,805,796 to Terry, Jr., U.S. Pat. No. 4,066,086 to Alferness et al.; informational type U.S. Pat. No. 4,374,382 to Markowitz, U.S. Pat. No, 4,601,291 to Boute et al.; and system U.S. Pat. No. 4,539,992 to Calfee et al., U.S. Pat. No. 4,550,732 to Batty Jr., et al., U.S. Pat. No, 4,571,589 to Slocum et al., U.S. Pat. No. 4,676,248 to Berntson, U.S. Pat. No. 5,127,404 to Wyborny et al., U.S. Pat. No. No. 4,211,235 to Keller, Jr. et al., U.S. patents to Hartlaub et al., U.S. Pat. No. 4,250,884, U.S. Pat. No. 4,273,132, U.S. Pat. No. 4,273,133, U.S. Pat. No. 4,233,985, U.S. Pat. No. 4,253,466, U.S. Pat. No. 4,401,120, U.S. Pat. No. 4,208,008, U.S. Pat. No. 4,236,524, U.S. Pat. No. 4,223,679 to Schulman et al., U.S. Pat. No. 4,542,532 to McQuilkin, and U.S. Pat. No. 4,531,523 to Anderson.

Brief Summary Text (7):
Chronically implanted cardiovascular devices for monitoring cardiovascular conditions and providing therapies for treating cardiac arrhythmias have vastly improved patients quality of life as well as reduced mortality in patients susceptible to sudden death due to intractable, life threatening tachyarrhythmias. As implanted device technology has grown more sophisticated with capabilities to discover, monitor and affect more patient conditions (including otherwise life threatening conditions) patients have enjoyed freedom from hospital or home confinement or bed rest. However, the improved mobility brings with it the need to maintain communications with the patient and the implanted device.

Brief Summary Text (9):
In current arrhythmia control devices, (e.g. cardiac pacemakers, and pacemaker-cardioverter-defibrillators) a relatively wide range of device operating modes and parameters are remotely programmable to condition the device to diagnose one or more cardiac arrhythmia and deliver an appropriate therapy. In cardiac pacemakers, the pacing rate in one or both heart chambers is governed by algorithms that process the underlying cardiac rhythm as well as physiologic conditions, e.g. patient activity level and other measured variables, to arrive at a suitable pacing rate. The pacemaker operating modes and the algorithm for calculation of the appropriate pacing rate are programmed or reprogrammed into internal memory by accessing the implanted pacemaker's telemetry transceiver with an external programmer. Even the diagnosis of a tachyrhythmia requiring delivery of a treatment therapy and the therapies to be delivered may now be governed by operating modes and algorithm parameters that can be programmed into and changed using such a programmer.

Brief Summary Text (10):
Such implanted devices can also process the patient's electrogram and any measured physiological conditions employed in the diagnosis and store the data, for subsequent telemetry out on interrogation by the external programmer. The telemetered out data is analyzed and may be employed to establish or refine the operating modes and parameters by a doctor to adjust the therapies the device can deliver. In general, the manner of communicating between the transceivers of the external programmer and the implanted device during programming and interrogating is referred to as telemetry.

Brief Summary Text (14):
The short range of conventional device telemetry is itself viewed as unduly limiting of a patient's mobility. In the medical monitoring field, longer range, continuously accessible telemetry has been sought and systems for doing so have been proposed. In U.S. Pat. No. 5,113,869 for example, an implanted ambulatory ECG patient monitor is described that is provided with longer range telemetry communication with a variety of external accessory devices to telemeter out alarm signals and ECG data and to receive programming signals. The high frequency RF

signals are encoded, including the implanted device serial number, to ensure that the communication is realized only with the proper implanted device and that it is not mis-programmed.

Brief Summary Text (15):
Telemetry communication with other implanted devices, particularly drug infusion pumps or pacemaker-cardioverter-defibrillator devices, to initiate or control their operation is also disclosed. Communication between the implanted AECG monitor and an external defibrillator is also suggested through low current pulses transmitted from the defibrillator paddles through the body link in order to condition the implanted AECG monitor to provide telemetry signals to the external defibrillator.

Brief Summary Text (16):
One of the external devices disclosed in the 869 patent is a wrist worn, personal communicator alarm for responding to a telemetered out signal and emitting a warning to the patient when the implanted AECG monitor has detected an arrhythmia. The patient is thereby advised to take medications or contact the physician or to initiate external cardioversion. The personal communicator alarm also includes a transceiver and may also be used to control certain functions of the implanted AECG monitor. A further, belt worn "full disclosure recorder" is disclosed with high capacity memory for receiving and storing data telemetered out of the implanted AECG monitor when its memory capacity is exhausted.

Brief Summary Text (17):
A remote, external programmer and analyzer as well as a remote telephonic communicator are also described that may be used in addition to or alternately to the personal communicator alarm and/or the full disclosure recorder. The programmer and analyzer may operate at a distance to the implanted AECG monitor to perform programming and interrogation functions. Apparently, the implanted AECG may automatically transmit a beacon signal to the programmer and analyzer to initiate an interrogation function to transmit data to the programmer and analyzer on detection of an arrhythmia or a malfunction of the implanted AECG monitor detected in a self-diagnostic test. Or by setting a timer in the personal communicator alarm, the implanted AECG monitor may be automatically interrogated at preset times of day to telemeter out accumulated data to the telephonic communicator or the full disclosure recorder. The remote telephonic communicator may be part of the external programmer and analyzer and is automatically triggered by the alarm or data transmission from the implanted AECG monitor to establish a telephonic communication link and transmit the accumulated data or alarm and associated data to a previously designated clinic or physician's office through a modem.

Brief Summary Text (18):
The combination of external devices provided to a given patient is at the discretion of the physician. It is preferred that at least the patient be provided with the external programmer and analyzer including a communications link.

Brief Summary Text (20):
In each of these disclosed systems, presumably, the patient is able to communicate with the physician's office or clinic contemporaneously with the transmission of data by modem. In all such telemetry systems for programming an operating mode or parameter or interrogating accumulated patient data or device operating modes and parameters, the patient is located within a short range, typically within sight, of the remote devices, particularly the remote programmer. If the patient is out of range of the programmer and an attached telephone system, the security of the patient is diminished. Consequently, at risk patients are advised to remain close by to the programmer and telephone for their safety.

Brief Summary Text (21):
The performance over time of implanted medical devices in the implant population is informally monitored by the periodic patient follow-ups employing the telemetry

system conducted by the physician and the reporting of device malfunctions from the physician to the device manufacturer. Moreover, operating algorithm improvements developed over time to counter adverse device performance reports or to simply improve device function are provided to physicians to employ in re-programming the implanted devices at the next patient follow-up.

Brief Summary Text (22):
Although significant advances have been made in allowing patient's who are dependent on implanted medical devices to be ambulatory and still allow for monitoring of the device operation or the patient's underlying condition, a need remains to expand patient security while allowing the ambulatory patient to range widely. Telemetry systems in current use require prepositioning of the telemetry head over the implanted medical device, although the telemetry systems described above may offer the possibility of telemetry at a distance of several meters. In any case, such telemetry systems cannot communicate patient device information (uplink telemetry) or accept re-programming (downlink telemetry) when the patient is in remote or unknown locations vis-a-vis the physician of medical support network. In certain patient conditions, the inability to communicate with the medical implant can significantly increase patient mortality or cause serious irreversible physical damage.

Brief Summary Text (24):
It is therefore an object of the present invention to provide a patient data communication system for world wide patient location and data and re-programming telemetry with a medical device implanted in the patient.

Brief Summary Text (25):
It is a further object of the present invention to address the above described problems by providing such a communication system allowing the device and/or patient to communicate with support personnel at any time and from any place.

Brief Summary Text (27):
These and other objects of the invention are realized in a first aspect of the invention in a system for communicating patient device information to and from a medical device implanted in an ambulatory patient and with a remote medical support network comprising: an implanted device telemetry transceiver within the implanted medical device for communicating data and operating instructions to and from the medical device in a coded communication, the implanted device telemetry transceiver having a transceiving range extending outside the patient's body a predetermined distance sufficient to receive and transmit coded telemetry communications at a distance from the patient's body; and an external patient communications control device adapted to be located in relation to the patient within the device transceiving range having a system controller for facilitating communications, an implant wireless interface including a control device telemetry transceiver for receiving and transmitting coded communications between the system controller and the implant device telemetry transceiver, a global positioning system coupled to said system controller for providing positioning data identifying the global position of the patient to the system controller; communications means for communicating with the remote medical support network; and communications network interface means coupled to the system controller and the communications means for selectively enabling the communications means for transmitting the positioning data to the medical support network and for

Brief Summary Text (29):
Preferably the system further comprises an external patient communications device adapted to be located in relation to the patient within the device transceiving range for providing patient voice and data communications with the system controller, so that patient voice communications may be effected through the communications interface means and the communications means with the remote medical support network.

Brief Summary Text (30):
Furthermore, the communications interface means may effect two-way communication of voice and/or data between the remote medical support network and the patient communications device and implanted device telemetry transceiver by inclusion of cards for accessing one or all of the communications means including a cellular telephone network and a satellite-based telecommunication network, a hard-wired telephone communications system and/or a hard-wired interface for computer based system for local area and for modem-based e-mail communications systems. The cards are preferably interchangeable to fit the application needed by the particular patient.

Brief Summary Text (31):
The communications interface means preferably include two-way voice communications between the patient and the medical support network and two-way data communications for selectively receiving interrogation or programming commands from the medical support network to interrogate or program the operation of the device operation and to interrogate patient location.

Brief Summary Text (32):
The present invention allows the residential, hospital or ambulatory monitoring of at-risk patients and their implanted medical devices at any time and anywhere in the world. The medical support staff at a remote medical support center may initiate and read telemetry from the implanted medical device and reprogram its operation while the patient is at very remote or even unknown locations anywhere. Two-way voice communications with the patient and data/programming communications with the implanted medical device may be initiated by the patient or the medical support staff. The location of the patient and the implanted medical device may be determined and communicated to the medical support network in an emergency. Emergency response teams can be dispatched to the determined patient location with the necessary information to prepare for treatment and provide support after arrival on the scene.

Brief Summary Text (34):
These improvements include enhancements to the ability to locate the user of the inventive device by dynamic relative location (also called dynamic relative navigation), time slicing of patient device signals to the provider network to improve the normal, non-emergency communications features, clock updating in the patient devices using high accuracy clock signals available from the satellite systems used in GPS which can enhance the fine granularity of available time slicing of patient device communications signals, the use of Enhanced 911 (called E-911, which will permit triangulation on the cell phone callers location through the E-9 11 system) or other emergency telephone systems (including current 911 systems), dead reckoning , improved GPS systems like DGPS, reporting changed location if a larger than some predetermined distance is traversed by the patient device, cell phone triangulation and emergency location, all to supplement contact location information, and the transmission of raw data to be position calculated at remote or emergency vehicle locations.

Drawing Description Text (3):
FIG. 1 is block level diagram of a first variation of the system of the invention for a patient having free ranging mobility including an implantable medical device, a patient communications control device and a medical support network optionally employing wireless satellite telecommunication and a global positioning satellite receiver;

Drawing Description Text (5):
FIG. 3 is block level diagram of a second variation of the system of the invention for a patient having limited mobility including an implantable medical device, a patient communications control device and a medical support network employing

conventional wired telecommunication;

Drawing Description Text (7):
FIG. 5 is a schematic illustration of the system of FIG. 3 employing a patient-worn, communications link and a line powered monitor for use in a patient's home; and

Drawing Description Text (9):
FIG. 7 is a schematic diagram of the main component communicating parts for preferred embodiments of this invention.

Drawing Description Text (10):
FIG. 8 is also a schematic diagram of the main component communicating parts for preferred embodiments of this invention, as adapted to help in quick location of patients.

Detailed Description Text (2):
The Global Communications and Monitoring System (GCMS) of the present invention provides a means for exchanging information with and exercising control over one or more medical devices implanted within the body of a patient employing the patient communications control device. The GCMS in its most comprehensive form of FIGS. 1 and 2 is intended to function no matter how geographically remote the patient may be relative to the monitoring site or medical support network. In this form, the GCMS provides an alarm to notify the medical support network should device or patient problems arise, determines patient location via the Geopositioning Satellite System (GSS), and allows verbal communication between the patient and monitoring personnel via a cellular telephone system link (if available at the patient location) or a satellite based telecommunications link if the patient is outside the range of a cellular link or subscribes only to the satellite-based link.

Detailed Description Text (3):
Improvements in technology are now available since the filing of the parent applications hereto that allow for enhancement of the features first described. Also, some additional problems and opportunities have been identified and addressed in this application. The improvement in GPS accuracy provided by DGPS systems and the development of cell phone location techniques have provided new opportunities to enhance patient location. The fact that behind some barriers, like trees, buildings, and so forth block some GPS signals has provided the inventor to improve the original disclosure. Likewise, some new thinking about how to improve the ability to find patients, including dead reckoning intelligence being added to the patient devices and use of time slice updates to the medical provider system have increased the usefulness of the invention.

Detailed Description Text (4):
The system is not intended to be limited to such remote use by a free ranging patient and is intended to also be used when the patient is less mobile. In the sub-system or second variation illustrated in FIGS. 3-5, the patient communication control device is intended to be coupled to a telephone or other communications system for a patient with more limited mobility. For example, the standard telecommunications system may be accessed either through a hard-wired link or by a cordless telephone with a telephone receiver in the room attached to a phone jack. In this case, the cellular or satellite-based telecommunications interface capabilities are not necessary, and the GSS capability may be superfluous. Preferably, the GCMS of FIG. 1 includes all of these capabilities embodied in a patient communications control device that is small and light enough to be attached to the patient when the patient is mobile or to be used by the patient as a free standing unit at the patient's residence or hospital room. Alternatively, as shown in FIGS. 3-5 the GCMS can be re-configured in part as a stand alone, line powered, room monitor and the remaining part can be implemented as a patient-worn, battery

powered, communications link with a transceiver capable of two-way communication between the patient, the implanted medical device and the line powered monitor.

Detailed Description Text (5):
FIGS. 1 and 3 are intended to show the alternate components of both of the variations of the GCMS, although the alternate components may be included in the same GCMS. The patient 10 has one or more implanted medical devices 12, 14, which in the latter case may communicate with one another is known as, for example, using the body medium in a manner described in commonly assigned U.S. Pat. No. 4,987,897 to Funke. The medical device 12 (and associated device 14, if present) may be, for example, an arrhythmia control device, e.g. a cardiac pacemaker or a pacemaker-cardioverter-defibrillator. A relatively wide range of device operating modes and parameters are remotely programmable to condition such a device 12 to diagnose one or more conditions such as cardiac arrhythmias and/or deliver electrical or other stimulus appropriate for therapy. The implanted medical device 12 may alternatively be a drug administration device, cardiomyoplasty device, neural stimulator or any other implantable device with electronic control functions that can be programmed and/or have memory for storing patient and device operating data.

Detailed Description Text (6):
At least one implanted medical device 12 possesses a transceiver of the type known in the art for providing two-way communication with an external programmer. The encoded communication may be by the RF transmission system such as is described in the above-referenced '869 patent or by using spread spectrum telemetry techniques described in U.S. Pat. No. 5,381,798 to Burrows or by the system disclosed in the above-referenced U.S. Pat. No. 5,683,432 or any of the known substitutes. The telemetry technique employed and the transceiver of the implanted medical device 12 have enough range to communicate between the transceiver in the implant wireless interface 22 in the remote patient communications control device 20 and the implant (12 . . . 14). The system disclosed in the above-referenced U.S. Pat. No. 5,683,432 may be employed to increase the accuracy and efficiency of the uplink and downlink telemetry.

Detailed Description Text (9):
Sensed atrial depolarizations or P-waves that are confirmed by the atrial sense amplifier (ASE) in response to an A-sense are communicated to the digital controller/timer circuit 330 on ASE line 352. Similarly, ventricular depolarizations or R-waves that are confirmed by the ventricular sense amplifier in response to a V-sense are communicated to the digital controller/timer circuit 330 on VSE line 354.

Detailed Description Text (12):
Data transmission to and from the external programmer of the patient communications control device of the preferred embodiment of the invention is accomplished by means of the telemetry antenna 334 and an associated RF transmitter and receiver 332, which serves both to demodulate received downlink telemetry and to transmit uplink telemetry. Uplink telemetry capabilities will typically include the ability to transmit stored digital information, e.g. operating modes and parameters, EGM histograms, and other events, as well as real time EGMs of atrial and/or ventricular electrical activity and Marker Channel pulses indicating the occurrence of sensed and paced depolarizations in the atrium and ventricle, as is well known in the pacing art. The IPG transceiver system disclosed in the above-referenced U.S. Pat. No. 5,638,432 may be employed to provide the uplink and downlink telemetry from and to the implanted medical device in the practice of the present invention.

Detailed Description Text (17):
The illustrated IPG block diagram of FIG. 6 is merely exemplary of one form of an implanted medical device 12 having a telemetry transceiver. The telemetry transceiver 332 is capable of receiving interrogation commands for uplink telemetry

of accumulated data, e.g. stored histograms of intracardiac electrograms (IEGM) or other electrogram (EGM) data maintained in RAM 310 or RAM/ROM unit 314, or of real-time data, e.g. the raw EGM of the patient's heart. In addition, it is capable of receiving permanent reprogramming commands or certain temporary programming commands for changing operating modes or parameters of the IPG 300 to counter a condition diagnosed by the medical support network. In this manner, the selective initiation of the operation of the therapeutic treatment (pacing for device 12) and monitoring can be effected through operating commands received by said implanted device telemetry transceiver 322. Furthermore, the operating algorithms governing the various pacing modes or parameters of those operating algorithms may be re-checked and altered through downlink interrogation and re-programming. In addition, the normal, periodic follow-up of the IPG 300 operation can be remotely initiated and conducted using the uplink and downlink telemetry between the transceiver 332 and the implant wireless interface under the control of the system controller as described below. The present invention can therefore readily be practiced using the basic hardware of existing microprocessor-controlled, dual chamber pacemakers, pacemaker-cardioverter-defibrillators and other medical devices, with a transceiver capable of uplink and downlink telemetry at a distance of up to several meters between the telemetry antenna 334 and the external telemetry antenna of the patient communications control device 20 or 20' of the variations of the present invention.

Detailed Description Text (18):
Returning to FIGS. 1 and 3, the patient communications control device 20, 20' therefore includes the implant wireless interface 22 that operates as a two-way telemetry transceiver for communicating with the telemetry transceiver of the implanted medical device 12 or devices 12, 14 and is controlled in those operations by a microcomputer-based system controller 24, preferably a 486XX microprocessor with RAM and ROM, e.g. the Cardio 486 available from SMOS SYSTEMS located in San Jose, Calif. maybe employed as the controller 24. The system controller 24 contains a system clock for maintaining an accurate time base which in one embodiment may be recalibrated periodically via accurate clocks in the GPS satellites 62. The microcomputer-based system controller 24 is coupled to the patient link 26 and the voice and data communications network interface 28 via voice and data buses 36 and 38. A patient link 26 provides a microphone and speaker through which the patient 10 can use for voice communication through the system controller 24 and the voice and data communications network interface 28 with the remote medical support network 50. Communication between the system controller 24 and the communications interface 28 is via data and voice buses 44 and 46. The system controller 24 may be part of a standard or modified cellular telephone or other personal communication device and may simply recognize specific telemetered signals from the implanted device if desired.

Detailed Description Text (19):
At the medical support network 50, a base station is provided to be in the communication link with the monitor 30 or the patient-worn communications device 40. The base station is preferably a microprocessor-based system that includes the software and hardware needed for voice communication with the patients to locate the patient and to interrogate and program the implanted medical devices using the communications interface links incorporated into the GCMS. Alternatively, a system can employ a device similar to the base station as a mobile unit in an emergency vehicle like an ambulance or helicopter as illustrated in FIG. 7, vehicles 105 and 105a. This mobile unit being tasked to find the exact location of a patient in an alarm condition and to rapidly administer medical aid and provide transportation to the most appropriate medical center. Patient voice communications through the patient link 26 include both actual patient voice and/or manually actuated signaling which may convey an emergency situation. For example, a patient may initiate communications through link 26 by depressing a button and/or speaking into the microphone/speaker. The patient voice is converted to an audio signal, digitized, encoded and transmitted either by voice bus 36 or by a transceiver in

the case where the patient link 26 is physically separated from the system controller 24, as described below. The patient activated emergency signal is likewise encoded and transmitted by data bus 38 or its equivalent transceiver encoded RF signal to the system controller 24.

Detailed Description Text (20):
Patient link 26 is a custom designed circuit that preferably has a microphone and speaker, associated drivers, a visual indicator (i.e. light or LCD display), and a patient activator. In the embodiment where the patient link 26 is physically part of the patient communications control device 20, the patient link also includes interface circuitry to buses 36 and 38 as shown in FIG. 1. Alternatively, the patient link 26 can be combined with the implant wireless interface as a combined PCMCIA (or other communications) card and a single data bus may be shared between the two circuits. In a further embodiment having a physically separated and separately powered patient communications control device 26, the voice and data buses 36 and 38 can be replaced by short-range wireless LAN PCMCIA cards at each end of the link. An infrared wireless LAN PCMCIA adapter with an integrated transceiver, Model No. 87G9743, is currently available from IBM, Inc., Somers, N.Y. An RF wireless LAN PCMCIA adapter with an integrated transceiver, Model No. 80G0900 is also available from IBM, Inc., Somers, N.Y. Other similar devices may be used.

Detailed Description Text (22):
Continuing specifically with the first variation of FIGS. 1 and 2, these figures depict the components of the more comprehensive GCMS of the present invention for allowing greater patient mobility, a wider range of communications network interface links and the capability of locating the patient anywhere in the world. In the GCMS of FIG. 1, all components of patient communications control device 20 are incorporated into the patient-worn communications device 40 which may be worn, for example, on a patient's belt or carried in a pocket, or worn on a wrist. Alternatively, as described above, the patient link 26 may be separated into a wrist-worn device having a separate transceiver for convenience of use in voice communication. In any event, the emerging Personal Communications System (PCS) technology may be employed in the miniaturization of the system components.

Detailed Description Text (23):
In accordance with one aspect of the invention, the system controller 24 is coupled to a GPS receiver 60 via bus 58 for receiving patient positioning data from an earth satellite 62. The GPS receiver 60 may use current systems such as the Mobile GPS.TM. (PCMCIA GPS Sensor) provided by Trimble Navigation, Inc. of Sunnyvale, California or Retki GPS Land Navigation System provided by Liikkura Systems International, Inc. of Cameron Park, Calif., or other similar systems. The GPS receiver 60 may be actuated by a command received through the system controller 24 from the medical support network, in the case of an emergency response. In the case of a non-emergency, periodic follow-up, the GPS receiver 60 may be enabled once an hour or once a day or any other chosen interval to verify patient location. The determined location may be transmitted to the medical support network and/or stored in RAM in the system controller 24. To maintain patient location information in the absence of GPS signals (such as inside metal buildings), a three-axis accelerometer 72 or other position/motion determining device can be incorporated into the system. By knowing original position (from the last valid GPS point), time (from the internal clock) and acceleration (motion), patient position can be calculated from the three axis coordinates realized from each accelerometer output calculated in each case from:

Detailed Description Text (25):
In the free ranging embodiment of FIGS. 1 and 2, two communication network interface links with the medical support network 50 are included, although the communication interface links of the second variation of FIGS. 3-5 may be included for optional home use. One non-hard-wired communication interface link is effected through the soon to be deployed, worldwide satellite communications system, called

"Iridium", by Motorola, Inc. of Schaumburg, Ill. This is a PCMCIA card 64 which may be built from common components by one skilled in the art. Another (second) communications link can be effected by the ARDIS (Advanced Radio Data Information Service) pocket radio communications network via PCMCIA link card 66, a Mobidem modem available from Ericsson, Inc. of Raleigh, N.C. Both of the radio links operate as modems with voice and data simultaneously transmitted via adding the CT8020 (DSP Group of Santa Clara, Calif.) to a standard data modem such as a 28.8 Keepintouch.TM. Express modem from AT & T Corp. of Largo, Fla.

Detailed Description Text (26):
Either or both PCMCIA cards 64 and 66 may be provided and they are coupled with the voice and communications network 28 via buses 68 and 70, respectively. When both are provided, access to the communications satellite link 80 is automatically obtained when a link to a cellular transceiver 82 is not possible.

Detailed Description Text (27):
It should be noted that "Iridium" manages cellular location of each subscriber in the network at all times. The subscriber unit, which in this invention would be incorporated into the device 20 (or communicatively connected to it) identifies itself and its location on a periodic basis to the system manager. In any system chosen it is expected that the control and communications device will have to report in to a management system regarding its location on a periodic or at least on a changed location basis or both. The implanted device need not be concerned about this activity and need not use any of its battery power to accomplish it since only the external device 20 (in the preferred embodiments) needs to be involved in such location communication. Only by knowing the patient location can the medical system 50 communicate to the implanted device at any time it wants or needs to. Accordingly, if emergency communications are expected short intervals between reporting in are recommended.

Detailed Description Text (28):
By checking in, the patient's external communications device would act like a cellular phone, answering incoming medical system messages broadcast into the cell in which it is located.

Detailed Description Text (29):
For patient convenience, a personal communicating device may incorporate the controller/communicator that communicates between implanted device(s) and the external world. In this way it could look like and operate as a personal communicator or cellular phone and reduce patient psychological discomfort. It should also be recognized that if the cellular telephone system manages all communication functions between the outside-the-patient-system and the medical community system, the implanted device need only be able to communicate with the cellular communications product.

Detailed Description Text (30):
FIG. 2 illustrates the free ranging patient 10 located remotely from the medical support network 50 and from any hard-wired communications link. The patient communications control device 20 is implemented in the belt-worn portable unit 40, although the patient link 26 may be worn separately on the patient's wrist (not shown). Alternatively, the patient communications control device 20 including the patient link 26 may be packaged into a portable telephone configuration and carried in a pocket. In any embodiment, the patient location may be determined by communications with the GPS 62. The voice and data communications link with the medical support network 50 may be effected by a cellular phone link including transceiver 82. Alternatively, the voice and data communications link may be effected using the communications satellite link 80.

Detailed Description Text (31):
The patient communications control device 20 of FIGS. 1 and 2 is powered by a

battery power supply 74 that preferably is rechargeable, or alternatively by commonly available batteries of any type. The system controller 24 includes a power control system for powering down the microprocessor and the associated components of the patient communications control device 20 except on receipt of an interrupt in a manner well known in the art.

Detailed Description Text (32):
Power consumption can be significantly reduced by powering up the communication and satellite circuitry periodically for a short period of time to re-acquire a GPS location and/or look for requests for data or status from the medical support network 50. This system power consumption reduction can greatly enhance battery lifetime requiring less frequent battery replacement or recharging, in the case of a rechargeable battery configuration. As an alternate to using a management system to maintain a patient location data based on patient's device periodic check-in each GCMS system for each patient could have a specific time slot (for example, 30 seconds) non-overlapping with other GCMS systems to power up, acquire location coordinates from the GPS system and be alert for a call from the medical support network 50. Periodically (for example, once per day), the medical support network 50 would reset/recalibrate the system clock in system controller 24 from the atomic clock in the GPS satellite system. This would ensure that no specific GCMS system clock would drift out of range of its allotted time slot and be unavailable for reception or drift into an adjacent time slot. Other time dividing schemes used in other arts may also be employed to maximize battery life for any system.

Detailed Description Text (33):
Time slicing the power up communications can increase the number of available time slots in a local system if the time slices are small and accurately maintained. To do this, the patient's system would simply update it's internal clock with reference to the atomic clock signal broadcast via the satellite to maintain accurate timekeeping for itself.

Detailed Description Text (34):
Turning to the second variation of the invention illustrated in FIGS. 3-5, it should be noted that the system of FIG. 1 may also be used in the home or in the hospital using the cellular communications link card 66. However, the modified patient communications control device 20' of FIG. 3 is preferably implemented with the voice and data communications network interface 28 having the capability of directly linking with a hard-wired phone line 32 or other communication services, which may include a

Detailed Description Text (35):
hospital installed network, e.g. a personal computer interface to a local area network. In either case, the modified patient communications control device 20' may be implemented in a number of portable or stationary monitor 30 forms.

Detailed Description Text (36):
In the embodiment illustrated in FIG. 4, all of the FIG. 3 components of the modified patient communications control device 20' are located in the monitor 30. The patient link 26 and the implant wireless interface 22 are hard-wired by voice and data buses 36, 38 and 42 to the system controller 24. In the embodiment of FIG. 5, the patient link 26 and the implant wireless interface 22 are located in the patient-worn communications device 12. The remaining components of the modified patient communications control device 20' are located in monitor 30, and suitable RF telemetry transceiver links are substituted for the buses 36, 38 and 42. In either embodiment, the power supply 74 of the monitor 30 may be line powered. The modified patient communications control device 20' within monitor 30 may also be coupled to a wall jack for hard-wired communications through the phone line 32 or other communications service 34 with a medical support network 50 located remotely or within the hospital.

Detailed Description Text (37):
As described above, implantable devices such as 12 . . . 14 include telemetry transceivers with range suitable for communicating over a short range to the implant wireless interface 22 of the modified patient communications control device 20' within stand alone monitor 30. This remote link offers advantages over patient-worn electrodes or programming heads required in the standard skin contact telemetry and monitoring used at present. Skin contact is difficult to maintain, as the adhesive for the electrodes or heads fails in time, skin irritation is often a problem and inadvertent removal of electrodes is also prevalent. Moreover, the EGM and other body condition monitoring capabilities of advanced implanted medical devices can be taken advantage of to substitute for in-hospital monitoring, e.g. Holter monitoring of the patient's electrogram. The electrogram and/or other sensor derived data, e.g. pressure, temperature, blood gases or the like, stored by the implanted device can be transmitted out continuously or on periodic automatic telemetry command and sent by the communications link to the remote or hospital medical support network 50.

Detailed Description Text (38):
In either environment of FIG. 4 or 5, the patient 10 may communicate with the medical support staff at the medical support network 50 through the voice channel provided in the patient link 26. The patient communications control device 20 or 20' in either embodiment can retrieve all implanted device stored patient and device operating data on receipt of a command from the medical support network 50, process and temporarily store such data, and transmit it back to the support network 50 for analysis. Moreover, implanted devices 12 . . . 14 may be reprogrammed from the medical support network 50 to alter device operating modes and parameters employing the modified patient communications control device 20' as a programmer. Finally, the modified patient communications control device 20' can transmit an alarm to the medical support network should there be problems with the patient or implanted devices 12, 14. For example, the implanted devices 12, 14 may signal a low battery condition or a low drug supply in the case of an implanted drug dispenser or other problems found in self-diagnostic routines periodically conducted within the implanted devices 12 . . . 14.

Detailed Description Text (39):
The variations and embodiments of the GCMS of the present invention provides comprehensive monitoring of implanted medical devices independent of the geographic mobility of the patient using the devices, obviating the need for the patient to return to a designated follow-up monitoring site or clinic. Moreover, it allows determination of the patient's geographic location via the GSS 62 while providing simultaneous two-way communication with devices and the patient when desired. In addition to emergency response and routine patient management, the GCMS facilitates medical device clinical studies, providing data collection at one central site from all study patients without requiring their active involvement or clinic visits. This is especially useful for conducting government-mandated post-market surveillance studies. Should there be need to upgrade or change the behavior of implanted devices the global system allows a central monitoring site to revise all involved implants anywhere in the world by transmitting new programming instructions to every device (assuming appropriate governmental authorities and the patients' physicians have agreed to the need for such changes). The patient need not be directly involved in this updating and need not be aware of the actual process.

Detailed Description Text (40):
A continuous and automatic medical monitoring service could be implemented to shorten response time for emergency medical situations or device events signifying patient difficulty. For example, a patient having an implanted cardioverter/defibrillator may be subjected to multiple defibrillation shocks, due to an underlying arrhythmia that cannot be converted by the shocks. To achieve this in the first variation of FIGS. 1 and 2, the implanted medical device 12 or 14

would initiate an emergency transmission to the patient communications control device 20 which would contain, but not be limited to, all or some of the following: patient name and mailing address, patient's current location, patient's current medical condition requiring assistance, ongoing "real time physiological variables", patient medical support team information, and current status (patient and device) and data stored within the implanted medical device. The patient communications control device 20 would obtain the GSS signal and transmit all the information to the medical support network 50. The patient may also transmit voice information if conscious of the event. A similar response to an emergency situation can be initiated and completed in the GCMS of the second variation using the modified patient communications control device 20'. And, as mentioned before, the time slice can be very small for each patient in a local provider network if the system checks its time clock against the atomic clock time signals available from the satellite.

Detailed Description Text (42):
Interactions with the implanted device and patient may be totally transparent to the patient, e.g., routine location checks to determine if the patient is in proximity sufficiently with the patient communications device to interrogate the implanted device or for follow-up data collection from the implanted device's monitoring memory or reprogramming of operations of the device effected at night while the patient sleeps. Or the patient may be included in the process, even to the extent that voice communications from the staff at the support network to instruct or reassure the patient are received in the patient communications control device.

Detailed Description Text (43):
The following chart details the communications pathways and the data that can travel over them are detailed in the following chart.

Detailed Description Text (44):
Using these communications features we can enhance the functionality available to the medical community for using these devices, while at the same time providing enhanced location of patients in emergency situations.

Detailed Description Text (46):
To reduce the amount of information processing that has to be done in the belt worn or IMD, we can take advantage of the nature of the GPS data itself. This data can be represented as follows. The table illustrates a variable length data transmission from the patient communications control device 20 (or 20') to the remote medical support network 50, for example.

Detailed Description Text (47):
When using the system to locate patients, the Contact Patient software module contains two identical arrays that form the binary data packets. While one packet is collecting real time data from the ADC 328 of implantable device 300 and the result of a GPS calculation, the other is communicating to the base station. Once every second the packets change function (commonly called double buffering). Real time displayed data is delayed by one second. The actual data transmission time depends on the amount of data, which is set by the digitization rate and the baud rate achieved over the wireless link between devices. Typically the table full of data would be transferred in a third of a second.

Detailed Description Text (48):
Alternatively, to save power in the patient worn belt and IMD devices, the use of the GPS Latitude and Longitude calculations need not be made. These could be calculated in a computer in a rescue vehicle (FIG. 7) or in the hospital, or somewhere else in the system, from raw GPS satellite data and thereby saving power for the small devices. Simply turning off the main GPS receiver activities will save power too, as was demonstrated in U.S. Pat. No. 5,592,173, incorporated herein

by reference. In this patent as well, a dead reckoning system is also suggested as being useful in the powered down mode.

Detailed Description Text (50):
The satellite 102 could be any of the GPS satellites, and the hospital or clinic 103 could be any medical facility. The personal system of the patient 104, may be worn for example on a belt or pendant or by other means kept near his body, as preferably two parts, the medical device MD (104a) and the belt worn device consisting of the programmer type communicating module PMD 104b for communicating with the medical device 104a, the telecom unit 104d for communicating with local telephony systems through wireless cell phone type technologies, and the DGPS or GPS unit 104c, which receives the satellite data and data from fixed base stations like station 101.

Detailed Description Text (51):
Referring now to FIG. 8, the belt worn device 104 receives satellite data A, broadcast from a set of satellites 102a-n (only one is pictured). It also receives broadcast correction data signals A' from a base station 101. The finding system in device 106 receives this same data. When alerted to be looking for the location of the patient worn device 104, device 106 will also be looking for information broadcast by device 104 in signal B. Generally this data will include information received from the satellites 102a-n that are in range of the belt worn device 104 in a packet 107a and the correction data received from the DGPS base station 101 in packet 107b. From this data the exact location of device 104, can be computed. By computing this location data itself, device 106 can then compute its own location and produce a vector to the device 104 for display (like display 106a) to the user of device 106. It is believed that the most effective display would be a directional arrow with a numeric display of distance units to the device as illustrated, but any combination of numeric, alpha, and illustrative displays as well as audible signaling including speech (for example, the device could say 20 yards to your left for use by a fire fighter in a smoky building) may be used if desired. There is also no reason not to incorporate a telephone receiver for direct communications with the patient in both the devices 104 and 106 if desired.

Detailed Description Text (55):
For example, in the United States, there is a new FCC proposed rule for broadband personal communications services carriers to comply with section 103 of the Communications Assistance for Law Enforcement Act, so many competing systems for location of cell phones will be available to supplement the finding features of this invention. It is believed that nearly all cell phone systems will be able to locate their users within 15 meters under this initiative. While this initiative is related to law enforcement activities primarily, it's use for medical emergencies should not be proscribed. There is also an initiative to have emergency calls to the Emergency 911 (E911) system from cell phones activate location information for the emergency response services to be more effective. Finally, if the medical device (104a of FIG. 7) notes that its wearer has an emergency condition, it could activate a call by a communication to the PMD corn. unit 104b to call the 911 or other emergency service (using unit 104d) through the wireless telephone system. An initial location data stream would preferably automatically be sent with the initial call when the call was made, using this new initiative system. This information receiving function could be incorporated into emergency telephone receiving equipment or if the emergency services don't provide it, a voice transmission of the nature of the emergency and perhaps some indication of location could be given by the telecom unit 104d from a bank of recorded message parts to emergency response personnel. If special equipment is incorporated in the emergency telephone communications system, emergency codes could be sent along with the location data or just sent by itself. Also, code data regarding the patient condition, like blood pressure, temperature, battery fault in an implanted device or any other relevant information regarding the patient condition, environment or device status can be reported with the emergency coding.

Detailed Description Text (61):
Step D has the system checking the high accuracy clock for comparison to the running real time clock in the patient local device or devices, such as the system 104 of FIG. 7, for example. If the time is accurate, then the device can simply process as normal, otherwise it needs to update the real time clock(s) it maintains so as to be able to communicate in its proper time slice within the local provider system.

Detailed Description Text (62):
In Step E, the system on the patient needs to check to see if the time from the properly updated real time clock is appropriate for it to send data, and if so, to activate the part of the system that communicates the data to the medical provider system. Otherwise if the time is not right, it can go back to Step A, and let the processor power stay off until the next value of interest is seen from the real time clock. (A description of power cycling to save battery life is found in U.S. Patent No. 5,592,173, incorporated by this reference, and a description of use of this in a vehicle location GPS system is in U.S. Pat. No. 5,777,580, also incorporated by this reference).

Detailed Description Text (63):
For communication between an implanted device and an externally worn patient device, common telemetry techniques presently used by any pacemaker manufacturer may be employed, as well as less evident techniques such as is described in the Funke Body Bus of U.S. Pat. No. 4,987,897, or his acoustic bus, in U.S. Pat. No. 5,113,859, both incorporated herein by this reference.

Detailed Description Text (65):
While there has been shown what are considered to be the preferred embodiments of the invention, it will be manifest that many changes and modifications may be made therein without departing from the essential spirit of the invention. It is intended, therefore, in the following claims to cover all such changes and modifications as may fall within the true scope of the invention.

Detailed Description Paragraph Table (1):
____ Medical Device(MD) Data to a. Serial No. or other unique ID data Belt Device b. Patient Condition c. Device status data d. Device Sensor data e. Coordinating data Belt Device to Medical a. Commands to MD (change a program Device(MD) parameter/value/sequence, interrogate, request a program or data, etc.) b. Coordinating data (ex. outside pressure) Network Data to Belt Device a. Commands to Belt Device or MD b. Coordinating data(ex. DGPS) Belt Device to Network a. Belt Device data (which includes all data from the MD and Belt Device generated data including Dynamic Relative Reference, and GPS and DGPS as required or requested.) ____ NOTES: Wakeups, acknowledgments, protocol, error correcting, and handshaking all as designed for each component to component communication It should be noted that Network includes for example any number of nodes in a telephone system that are part of the health care provider network, or any specific one of such nodes.

CLAIMS:

1. A patient monitoring system comprising:

a transceiver unit to be located in immediate proximity to a patient's body for communicating with a device implanted in the patient's body and with a telephone system outside the patient's body,

the transceiver unit comprising,

a GPS location system for receiving satellite transmitted information from a set of

earth orbiting satellites,

an IMD receiving telemetry circuit means for receiving telemetry from said implanted device,

a memory circuit for storing data relating to data received from said implanted device and from said earth orbital satellite,

telecommunications module for communication through wireless telephonic channels to said telephone system,

real time clock circuit producing an output signal for a real time clock,

transmission initiation processor for generating an automatic transmission over said telecommunications module through said wireless telephonic channels containing information related through said implantable device to said transceiver unit, said automatic transmission to occur at a set of periodically occurring fixed times, and

real time clock circuit update processor for interpreting received satellite transmitted information and providing an update for the real time clock circuit based on said satellite transmitted information so that said transmission initiation processor can operate within an extremely accurately clocked time slice.

7. Emergency response system for receiving location information from a transceiver unit in proximity to a patient with an implantable medical device in communication with said transceiver unit, said emergency response system comprising;

at least one mobile unit operational on an emergency basis for receiving location information from said transceiver unit and having a GPS system and a computer system therein, such that said mobile unit GPS system produces data related to a present location of said mobile unit and makes said data related to said present location of said mobile unit available to said computer system and said mobile unit computer system comprises processor means for processing said received location information from said transceiver unit and said data related to the present location of said mobile unit to produce an indication of the relative position of said transceiver unit to said mobile unit, and

a base station for receiving through a telephone system a current location representation from said transceiver unit along with status information related to an implantable device implanted within a patient associated with said transceiver unit.

8. Method for operation of a transceiver unit for wearing on a person having location means and means for communicating with an implant and with a telephone network comprising:

providing a telemetric communications pathway between an implanted medical device (IMD) and a patient word device(PWD) to facilitate the transfer from the IMD to the PWD of data relating to any of the following information types: a. Ser. No. or other unique ID data, b. Patient Condition, c. Device status data, d. Device Sensor data, and/or e. coordinating data,

providing a telemetric communications pathway between an IMD and a PWD to facilitate the transfer from the PWD to the IMD of data relating to any of the following information types: a. Commands and /or b. Coordinating data,

providing a telemetric communications pathway between a node on a telephone network and said PWD and between a satellite GPS system and said PWD so as to facilitate

the transfer of any of the following information types from said node and/or said satellite GPS system to said PWD: a. Command data and/or coordinating data, and

providing a telemetric communications pathway between a node on a telephone network and said PWD so as to facilitate the transfer of any of the following information types from said PWD to said node: PWD device data including any data received by the PWD from the IMD and/or any sensor data that may be developed and stored by the PWD and/or PWD status data and/or Dynamic Relative Reference data from a dead reckoning system associated with said PWD, and GPS and DGPS which may be stored by the PWD.

16. A method as set forth in claim 8 and further comprising

providing a real time clock system and a clock updating system for correcting the value of real time clock information based on satellite signals to said transceiver unit,

automatically using the corrected real time clock values to trigger an automatic turn on a communication between said PWD and a node in a narrow time slice, and

reporting to said node by said PWD some or all data facilitated for transfer on that communications pathway.

20. A method of monitoring a patient having a transceiver associated therewith and an implanted medical device in communication with said transceiver comprising;

monitoring GPS and DGPS location data by said transceiver,

interpreting said location data by said transceiver and

if said location data interpreted by said transceiver indicates the patient transceiver is outside a predetermined area,

initiating a telephone call by said transceiver to a telephone node on a telephone network, indicating the present location of said transceiver.

21. A method of monitoring a patient having a transceiver associated therewith and an implanted medical device in communication with said transceiver comprising;

monitoring the implanted medical device for either a lack of signal over a predetermined period of time or for an alarm signal generated by said implanted medical device and

if either said alarm signal is received or if said lack of signal exists over said predetermined period of time,

automatically initiating an emergency telephone call by said transceiver to a node on a telephone network indicating an alarm condition to said node.

22. A method of operating an emergency patient location system comprising,

providing said system with patients having implanted medical devices and transceiver units for monitoring communications from said implanted medical devices,

providing said transceiver units with means to receive GPS data and to store said GPS data,

providing said transceiver units with telecommunications equipment,

awaiting the development of emergency conditions to be reported by said transceiver units to said system across telephonic communications pathways,

dispatching emergency mobile units having receiver means tuned to receive signals from said transceiver unit reporting said emergency condition

reporting from said transceiver unit location information,

receiving said location information in said emergency mobile unit and

employing said location information by said emergency mobile unit to locate the patient having the reported emergency.

26. A system for communicating with a medical clinic implanted in an ambulatory patient and for locating the patient to selectively monitor the functions of the medical clinic and provide assistance to and communications with the patient, the system comprising:

an implanted device telemetry transceiver within the implanted medical clinic for communicating data and operating instructions to and from the medical device, the implanted medical device telemetry transceiver having a transceiving range extending outside the patient's body, a distance sufficient to receive and transmit such telemetered communication;

a communications network interface means coupled to a system controller and a communications means for selectively enabling to transmit positioning data to a medical support network and for selectively receiving commands from the medical support network wherein an implantable wireless interface including a real time clock and a system for updating said real time clock based on accurate time clock information in signals received from a global positioning system is integrated therewith;

dead reckoning circuit means for determining the relative location of said transceiver over time to any location at a fixed time during which an acceptable fixed location of said transceiver is known, and wherein a circuit means for producing a representation of received location information for presentation to a telecommunications module is configured to also provide a representation of said dead reckoning information to said telecommunications module; and

a distance traveled interpretive processor for receiving an output from said dead reckoning circuit and determining a distance traveled therefrom;

a trigger circuit for triggering the initiation of transmission to a telephone system by said telecommunications module including said communications means when the distance traveled interpretive processor determines a distance traveled is greater than a predetermined trigger distance value.

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L22: Entry 1 of 2 File: USPT Feb 20, 2001

DOCUMENT-IDENTIFIER: US 6192303 B1
TITLE: Vehicle diagnosing apparatus

Application Filing Date (1):
19980209

4:36-44

Detailed Description Text (3):
This vehicle diagnosing line 1 is provided with auxiliary equipment in the form of a plurality of portable diagnosing units 2 and a host computer 3. Each of the portable diagnosing units 2 is provided with an antenna 20. By connecting another antenna 30 to the host computer 3, it is made possible to wirelessly communicate bidirectionally between each of the portable diagnosing units 2 and the host computer 3. It is also made possible to wirelessly communicate bidirectionally between respective portable diagnosing units 2. Further, each of the portable diagnosing units 2 is provided with a bar code reader 21 for reading a bar code BC which represents a peculiar vehicle number given to each of the vehicles.